TATA STUDIES IN CURRENT AFFAIRS

your food

M. R. MASANI

TATA STUDIES IN CURRENT AFFAIRS are meant to stimulate interest in some of India's vital problems and to educate public opinion.

YOUR FOOD, dealing as it does with India's Problem Number One, certainly fulfils that purpose. The Author is a member of the Constituent Assembly of India and of the Indian Legislative Assembly and was the founder and Chairman of the People's Provincial Food Council, Bombay from 1944 to 1946.

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TATA STUDIES IN CURRENT AFFAIRS 1

YOUR FOOD

A STUDY OF THE PROBLEM OF FOOD AND NUTRITION IN INDIA

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by

M. R. MASANI

Published by

TATA SONS LTD.

Sole Distributors:

ORIENT LONGMANS LTD.

BOMBAY • CALCUTTA • MADRAS

One Rupee

First Published, December 1944.
Second Edition, July 1945.
Third Edition July 1947.

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Printed by S. Ramu at the Commercial Printing Press 105, Cowasji Patel Street, Fort, Bombay, and Published by Morarji Padamsey for Padma Publications Ltd. Laxmi Building, Sir Phirozeshah Mehta Road, Fort, Bombay.

TRANSLATIONS

AVAILABLE IN

Hindustani
Marathi
Gujarati
Bengali
Kannada
Telugu
Malayalam

UNDER PREPARATION

Tamil
Punjabi
Sindhi

FOREWORD

This is the first of a series of publications which Tatas are sponsoring with a view to stimulating interest in some of the most vital problems of India and, by the widespread dissemination of knowledge on such subjects, creating a body of public opinion which may, in time, influence policy and action.

The first publication of the series deals with the most universal and compelling of all problems—hunger and its satisfaction. Food is topical in the most distressing sense of the term. "All men are consumers of food. More than two-thirds of them are food producers."

There is not much danger in India of the emergence of that somewhat tiresome creature, the food faddist. The bulk of our population lives on the margin of subsistence, and our problem is how to raise more food and better food. We cannot hope to solve the problem unless we realize how grave it is, and have some idea of how it can be met. That is the reason for selecting Food as the subject of the first of these publications.

The book has been written by Mr. M. R. Masani of the Public Relations Department of Tatas. The idea being to appeal to a very wide circle of readers rather than to a select few, the author's presentation has had to be simple and 'popular,' more in the nature of a fireside chat than an elaborate treatise on the subject. The illustrations are by Mr. A. R. Acott.

We desire to express our gratitude to Sir Pheroze Kharegat, Additional Secretary to the Government of India in the Department of Education, Health and Lands, for his valuable guidance in the preparation of this book. Our thanks are also due to Dr. W. R. Aykroyd, Director of the Nutrition Research Laboratories, Coonoor, for the technical assistance so willingly given by him and for the information and facilities available at the Laboratories which were placed at the author's disposal. It should be made clear, however, that neither of them is responsible for such views and opinions as are expressed by the author.

If the book is found to have a wide appeal, it is intended to have translations in some of the leading Indian languages. Tatas will endeavour, as far as is compatible with present-day restrictions, to respond to requests for free copies from rural development centres and educational and other institutions which would not otherwise be able to obtain them.

H. P. MODY

December 1, 1944.

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1. A PARADOX

Has it struck you that Man is the only animal who grows his own food ? Other animals either eat their food as and where they find it, or collect food and store it, or kill other animals and eat them up. This difference is well brought out in some rather amusing lines by Dorothy Wellesley :

How unconcerned the
grazing sheep,
Behaving in such
manner ;
They stand upon their
breakfast, they
Lie down upon their
dinner.

This would not seem
so strange to us
If fish grew round
our legs,
If we had floors of
marmalade
And beds of buttered
eggs.

It is only Man who sows seed in the ground and waits for the crop to come up. This has not always been so. In his younger days even Man did not grow food. The primitive man was just a hunter and food collector. Later on in the story of his existence he stumbled upon the discovery that he could actually produce from the soil what he wanted. It is believed that it was the women of some primitive tribes, like the one shown here, who made this exciting discovery by accident. They scattered wild corn or spat out seeds nearby their rude huts and found to their surprise and delight that after some time a fresh crop appeared !

The discovery of agriculture made it possible for the soil to feed and maintain larger and larger numbers of human beings. The population of the world has, as a result, gone on increasing steadily and not so slowly. India is one of those countries where the growth of population has been most marked. Our country is one of the most densely populated in the world.

Something seems, however, to have gone wrong on the way, because you find that the soil of India is not able any longer to feed those who inhabit this country. India presents a striking paradox. On the one hand it has a huge area—360 million acres—sown with crops, of which 80 per cent are food and fodder crops. Our soil too is in the main potentially very fertile, and we have a varied and hospitable climate, a monsoon that gives us plenty of water, and thick forests to protect our soil. Alongside, we have unparalleled man-power—350 million out of 400 million living in villages, and of these 80 per cent working on the land. We also have a large stock of those animals that help us in cultivating the soil—our cattle. Of these we have some 200 million out of 700 million in the whole world—28.5 per cent.

With all these at our disposal, we yet do not seem to manage to feed ourselves. We have got so used to this state of affairs that we are no longer shocked when we are told that a majority of our people do not at the best of times get even one square meal a day. This state of affairs was admitted by the representatives of the British Government at a conference on food which met at Hot Springs in the U.S.A. in 1943 when they said that one-third of the Indian people are habitually underfed in normal times. Even sadder was the statement

made by the Director of Public Health in Bengal in 1933 who said that the peasantry of Bengal were in large proportion subsisting on a dietary on which even rats could not live for more than a few weeks ! That was some ten years ago and last year, according to the Anthropological Department of the Calcutta University, no less than three and a half million people died of starvation and of diseases caused by starvation in the province of Bengal.

How has this come about ? How can this paradox be explained ? And how can we put an end to this state of affairs ? That is what this book is about.

2. WHY DO WE EAT ?

There are certain things we do every day of our lives as a matter of course—without so much as thinking about them. We awake in the morning, move from place to place, meet and talk to people and, when night falls, we go to sleep. Another thing we do just as automatically is to eat and drink. If somebody stopped us and asked : 'Why do you eat ?' we should be taken aback and answer indignantly : 'What on earth do you mean ? Don't you ?' Yet it is a perfectly legitimate question and every one of us ought to know the answer.

Many of us, if pressed further, would say we eat because we like to eat. It is one of the good things of life. There are wise men who, towards the end of a long life, have observed that food is one of the most reliable and lasting sources of happiness ! Others amongst us who may not enjoy their food quite so much and think it a bit of a bother would answer that we eat because we must, that we eat to live and not live to eat. Which is very true. Not so long ago Mahatma Gandhi managed to survive without food for twenty-one days and cases are on record of people who have survived without food for as many as seventy-seven days. But these are exceptions that prove the rule. The wonder with which these feats of endurance are received show how very dependent we are on our food and how without it the entire human race would be extinct in a few weeks.

What exactly is food, and how does it keep us alive ? In what ways does it put life into us ? The chief functions of food are threefold ; (i) to yield energy ; (ii) to build and renew body structure ; and (iii) to regulate internal conditions and processes so as to maintain life.

The first main function of food is to provide fuel for the generation of energy in the human body. In this context, the body may be appropriately compared to a steam engine or a motor car which is in motion. Just as the engine or automobile, however perfectly made, cannot move without fuel, so too the human body needs fuel or energy to do its work. Actually, our fuel consists not of coal or of petrol, but of certain constituents of food which are called fat and carbohydrate. Protein can also sometimes serve as a fuel. Combined with oxygen and water, these fuels create the necessary warmth and enegy which enables both bodily movement and mental exertion. Fats can be found both in animal and vegetable foodstuffs. Animal fats include mutton fat, butter, ghee and fish oils. Examples of vegetable fats are olive oil, almond oil, coconut oil, gingelly oil and mustard oil. Carbohydrates are of two kinds,—starch and sugar. Starch is obtained from rice and other cereals, sago, tapioca, potatoes and numerous other foods, while sugar is yielded by sugar-cane, honey and fruits.

The second function of food is to provide the materials necessary for the growth and building up of the body, as also for its repair. The growth of the human body may in this respect be compared not with the running of an engine or motor but with the building of a house. You know the umpteen things that are needed to put up a structure, such as stone, bricks, cement, wood, glass and tiles. So too, various building materials are needed if the human body is to grow. Learned people like scientists and doctors tell us that the most important of these building materials are substances known as proteins. It is out of

these that the flesh and muscles and the various organs of the body like the brain, the liver, the kidneys and the heart are constituted. The proteins help the baby to form within the mother's womb. They contribute to the progress of the infant through its various stages until a fully grown man or woman is produced, and they also serve the purpose of replacing and repairing the wear and tear resulting from the body's functioning. These proteins are to be found both in animal products like milk, meat, eggs and fish, and in vegetable products like pulses and nuts and to a smaller extent in cereals. There are two other constituents of food which help in the building of the body in not quite such an important way, of which one is called fat, which we all carry in different degrees and which makes our bodies smooth and rounded and graceful, unless we have too little or too much of it ! The other is mineral salts, which help to build our bones and tissues. But of these two elements we shall speak in greater detail presently.

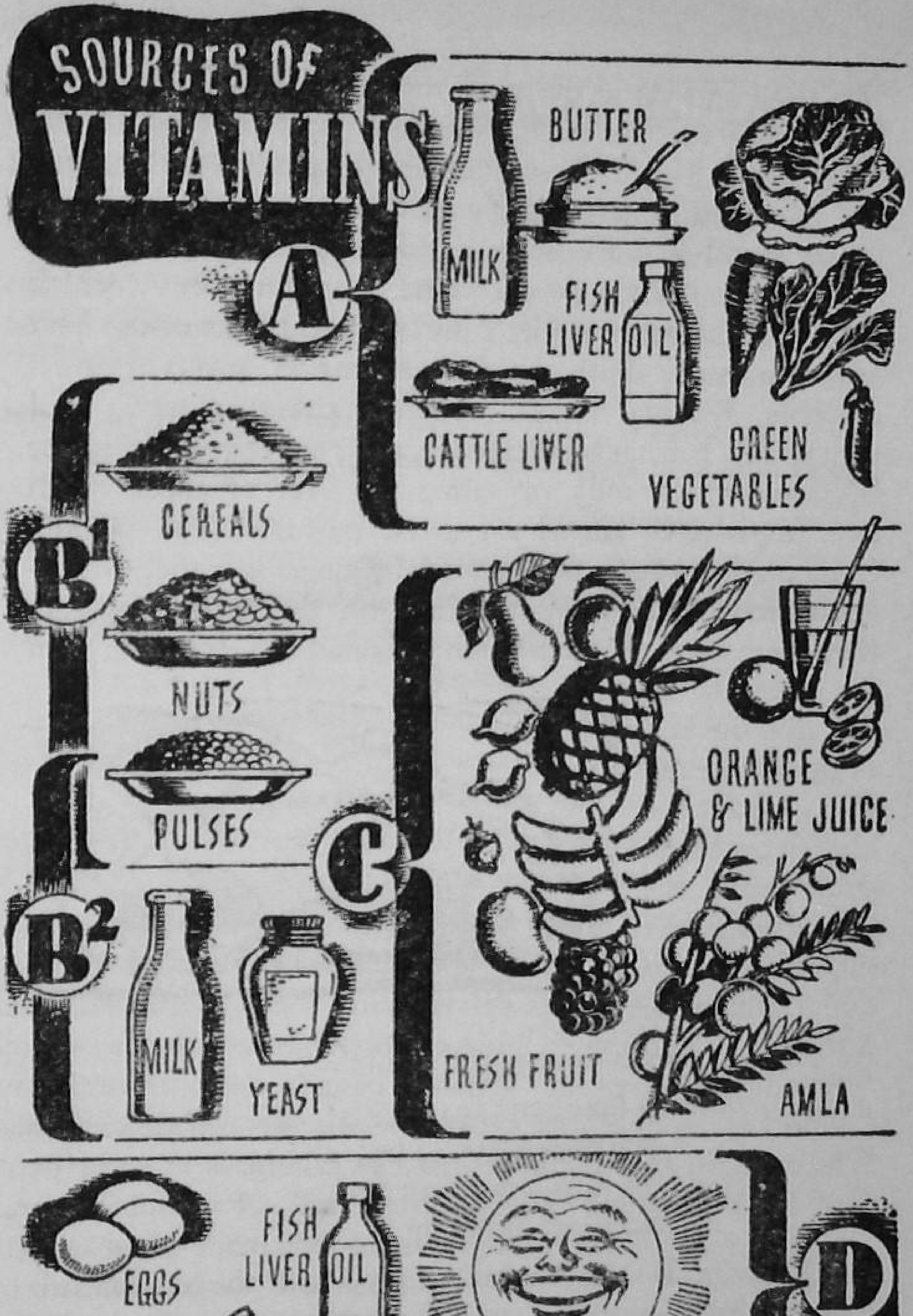
The third main function of food is to provide those regulating factors which " keep the reactions running at the right rates, and keep the conditions inside the body within the zones of delicate adjustment which the life process requires ". This does sound rather mysterious, doesn't it ? But then, the constituents of food which perform this complicated function *are* rather mysterious. They are known to us as vitamins, a name given to them in 1912, from 'vita' which means life, because they are necessary for life. Different vitamins have different functions. Sometimes they act as builders who organise and regulate the use of building materials (proteins) in the growth of the human body. At others they may be compared to the oil that is necessary in an automobile, without which even the petrol (fats and carbohydrates) cannot make the motor go. They may be described as accessories to the main elements of food which the human body cannot manufacture

for itself and yet at the same time needs not only for well-being but for life itself. Vitamins exist in food in such very tiny and elusively small quantities that till the beginning of this century even their existence had passed unnoticed. Now they can not only be extracted and isolated from the things in which they are found in nature, but they can actually be manufactured by chemical processes. These are known as synthetic vitamins.

The English humorist A. P. Herbert gives us some good advice in the course of one of his delightful verses :

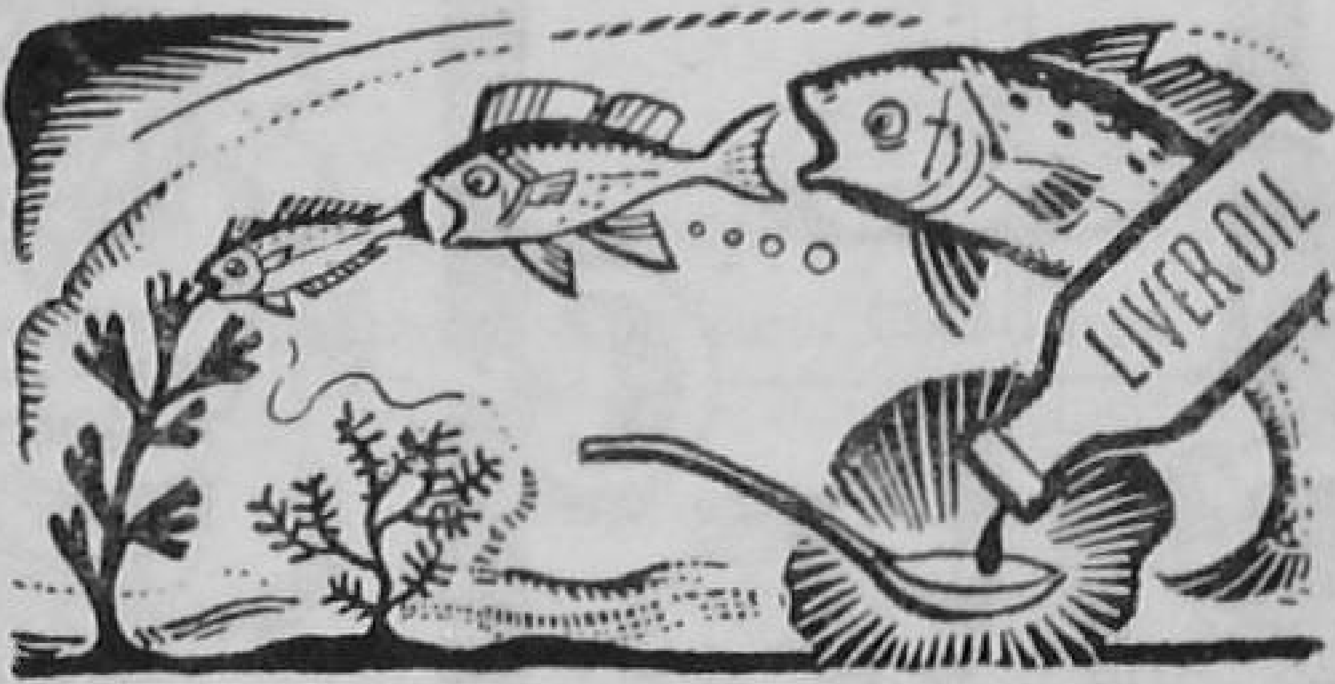
Vitamin 'A'
Keeps the rickets away
And succours the meagre and nervy ;
'B' 's what you lack
If the stomach is slack
And 'C' is the foe of the scurvy ;
So when a man dines
Let him murmur these lines,
Or sure he will live to deplore it—
Just ask yourself 'What
Disease have I got,
And which is the vitamin for it ?

Vitamin A works primarily on the eyes, the skin and the membranes which line internal organs like the lungs and the digestive system. When it is not taken in sufficient amounts trouble arises. An eye disease called keratomalacia which is a common cause of blindness in some parts of India is caused by a persistent lack of vitamin A. Sad to say, many children are unnecessarily made blind by this disease every year. A less serious eye disease caused in the same way is night-blindness, which means that even a normally healthy person who can see all right during the day loses his sight when it is dark. Night blindness can, however, be cured quickly if a lot of vitamin A is taken.


SOURCES OF VITAMINS
A
MILK
BUTTER
FISH LIVER OIL
CATTLE LIVER
GREEN VEGETABLES
B1
CEREALS
NUTS
PULSES
B2
MILK
YEAST
C
FRESH FRUIT
ORANGE & LIME JUICE
AMLA
D
EGGS
FISH LIVER OIL
BUTTER

Another complaint caused by this deficiency is a dry or rough skin, often called "toad skin," because it looks like the skin of a toad.

You will want to know in what things vitamin A is to be found in both animal and vegetable foods. In the latter case it is known as carotene or pro-vitamin A, which is to be found principally "in the green things of the land and the sea." Both land and marine plants possess carotene. We can obtain vitamin A either by eating land vegetables, particularly carrots and leafy vegetables, or by drinking the milk or eating the liver of cattle which have themselves grazed on green pastures. The vitamin from marine plants is obtained by us in a rather roundabout way. Little shell-fish feed on the marine plants; they themselves are then eaten by small fish; these in turn are eaten by big fish like the cod or the shark; and when we eat the big fish or, better still, drink the cod or shark liver oil, we get our quota of vitamin A. It rather reminds one of the rhyme:



Big fleas have little fleas
Upon their backs, to bite 'em,
And little fleas have lesser fleas,
And so ad infinitum.

Vitamin B was originally supposed to be just one element, but now it has been found that there is quite a variety of B vitamins, which are now named B_1 and the B_2 group respectively. Let us have a look at B_1 which is a very important vitamin. This vitamin regulates the

use of carbohydrate in the body. Its absence causes a disease known as beriberi, in which the legs become weak and helpless and the heart may fail in its task of pumping blood all round the body. Beriberi is very common in parts of Andhradesh in our country, in China, in Java and in other countries in East Asia. Now, why is this so and in what foodstuffs is vitamin B_1 to be found ?

Vitamin B_1 is to be found *inter alia* in whole cereals, pulses, nuts and yeast. Beriberi is caused when people eat rice or wheat which has been milled and polished so that the germ and bran, which contain vitamin B_1, have been already removed. This is particularly so where the rice is eaten "raw", that is, where the rice is not boiled or par-boiled before milling. It is because the people of a part of Andhradesh eat rice which is milled when it is "raw" that they suffer from this awful disease.

The Vitamin B_2 group or complex is now known to be made up of at least three essential factors. One of them helps to keep the eyes, tongue and intestines in a healthy state. Important sources of the B2 complex are whole cereals, pulses, milk, liver and yeast.

Another important vitamin is **Vitamin C,** which is a valuable substance in the forming of the blood and which also acts on the skin. Lack of this vitamin leads to a disease called scurvy, which affects the teeth and the gums, and causes pain in the joints and swellings in different parts of the body. This apart, Vitamin C is necessary for keeping good health in general.

Vitamin C is to be found in fresh fruits and vegetables and sprouted pulses. A particularly rich source of this vitamin is *amla* or *nellikai*. Oranges also contain this vitamin, but one *amla* fruit contains as much as two oranges. Vitamins were only discovered in this century, but as far

back as the third century B.C. the Emperor Asoka, one of the wisest men the world has produced, seemed to divine vitamin C in the *amla* fruit. He once sent a basketful of it as a valuable present to the King of Ceylon.

That leaves us to deal with **Vitamin D**, which works primarily on our teeth and bones. Deficiency of vitamin D causes a disease which, in infants and children, is called rickets, and in adults, chiefly women, osteomalacia,—which means "softening of the bones." In these cases the bones become soft and bent so that the victim becomes a cripple. Osteomalacia is particularly prone to attack women in the child-bearing period. This is because the bones of the baby which is still to be born are formed by draining away Vitamin D and bone-forming substances from the bones of the mother. If these are not replaced in the system, her own bones become so bent and deformed that she is crippled, causing a contraction of the pelvis, and she may not be able to bear another child. Vitamin D is to be found in whole milk, in milk products like butter and ghee, in eggs and in some fish. Fish liver oil is a rich source. That is why rickets and osteomalacia can be cured by taking cod or shark liver oil or by taking pure vitamin D itself. There is another source of vitamin D, and that is the Sun. The action of the rays of the Sun on our skin manufactures this vitamin. That is one reason why people in Southern and Central India, where the sunlight is very strong, do not often suffer from rickets or osteomalacia, while people in the North, particularly women who are kept behind the *purdah*, are its worst victims.

There are other vitamins called vitamins **E**, **K** and **P**, which are not of quite such importance, so we shall pass them over.

A last constituent of food, which in its function is not unlike the vitamins, are the mineral salts. There are believed to be some thirty of them, some of them acids

and others alkalis. The more nutritively important among them are calcium, potassium, sodium, phosphorus, iron and iodine. These minerals act partly, along with proteins, as building materials, particularly for the bones and the teeth, and partly as regulating factors like the vitamins.

Let us have a quick look at one or two of these minerals. **Calcium** is one of the most important, which is required for the maintenance of the heart-beat, and for the coagulation of the blood and for the formation of the bones and teeth. Each of us takes in and excretes a certain quantity of calcium every day. This must therefore be replaced. Children need it more than grown-ups. Women carrying babies require even more, because they need it both for themselves and for the embryo. One of the best sources of calcium is milk. That is Nature's way of providing this very necessary mineral to the little calves and buffaloes and goats who need it just as much as human children. Another rich source of calcium is green leafy vegetables.

Iron is another mineral that our bodies need. Its purpose is to help in the formation of haemoglobin or blood pigment, which gives blood its red colour and which carries oxygen to the tissues. Shortage in iron results in anaemia. A good source of iron is green vegetables, in particular spinach and cabbage. Have you seen how Popeye the Sailor Man on the screen always empties a tin of spinach before he goes in for a scrap ? That is because he gets not only iron but also vitamin A and calcium out of it. Milk, which is otherwise such a complete food, is poor in iron. Nature,

however, takes good care of babies when they are born, because it supplies them with about seven months' stock of iron !

We have now covered the various consitituents of food and we find that all the hundred and one things which we eat can be resolved into one or other of the five basic constituents : (1) fats, (2) carbohydrates, (3) proteins, (4) vitamins, and (5) mineral salts.

3. HOW MUCH TO EAT

This is a subject on which a lot of difference of opinion may be found. We each have our own ideas about how much to eat. Young folk, for instance, are apt to take a more optimistic view of their capacities than their parents !

Besides, how much we eat of a particular thing depends very much on how appetising or tasty we find it. While we may each have our own ideas on this subject, science has made it possible nowadays to estimate how much we really need to eat to keep alive, to keep healthy and to keep fit for work.

The first man to experiment on this subject was a Professor of Medicine in Padua in Italy in the sixteenth century. His name was Sanctorius. He used to eat his meals in a chair suspended from one end of a balance. On the other side of the scales he placed a weight equal to his own weight before the meal *plus* that of the quantity of food he wanted to eat. When the balance tilted his way, he stopped eating !

The quantity that it is necessary for each of us to eat varies according to our age and condition, the kind of work we do, and the climate in which we live. Thus a man living near the North Pole in an icy cold country needs more food than a man living in the burning heat of the Equator. Even in the same country and climate, a man performing hard manual labour or intense mental exer-

tion needs more food than another living an easy and indolent life. A man generally requires more food than a woman, except when she is carrying a baby within her. A growing boy or girl requires at certain ages quite as much food as a strong, hard-working man !

How is the quantity of food to be measured ? How can we tell whether a man who has had a plate of curry and rice has eaten more or less than a man who has had a plate of vegetables and chapatties ? And has a man who has drunk a glass of milk taken less food or more than either of the other two ? Science has made it possible for us to answer these questions. Just as we measure length in

inches, in feet, in yards and in miles ; just as we measure weights in ounces, in pounds, in hundred-weights and in tons; just as we measure the rate of doing work in horse-power; so too we can measure the energy provided by food in calories. It is a common denominator to which we can reduce various kinds of food.

What is a calorie ? In nutritional science, one calorie is the amount of heat required to raise the temperature of 1 kilogramme (2.2 lbs.) of water by one degree Centigrade. A device for measuring the amount of heat is called a calorimeter. You find out the calorie content of a particular foodstuff by burning a certain quantity of it in the calorimeter. The heat produced is measured by the rise in temperature in water surrounding the chamber in which the food is being burnt. Nowadays, rather complicated calorimeters have been devised in which even a man or an animal can be enclosed in a chamber and the heat exuded can be measured.

Different foodstuffs have different values in terms of calories. You can get the same number of calories (*i.e.*, the same amount of energy) from a small quantity of one kind of food as you can from a large quantity of another. One-ninth of a gramme of fat yields one calorie, while one-fourth of a gramme of protein or carbo-hydrate is required to produce a similar yield. So if you know how many grammes of fat and how many grammes of protein and carbo-hydrates you have eaten for your lunch or dinner, you can multiply the grammes of fat by 9 and the grammes of protein or carbo-hydrate by 4. Total up the two and you will know how many calories you have consumed. That is how it is possible to tell how much a man has eaten or should eat for the day.

As we saw earlier, we need to eat different quantities according to our age, sex, condition and climate, and the kind and amount of work we do, and so the number of

calories required cannot be same for each one of us. Let us, for instance, take the case of a factory worker. An average man weighing about 150 lbs. expends energy, and therefore needs to replace it, at the following rate :

	calories
8 hours' sleep at 65 calories per hour	520
8 ,, manual work at 240 calories per hour ...	1920
8 ,, spare time (walking, light exercise, standing, sitting at rest) at 135 calories per hour	1080
	3520

In war-time Germany a factory worker was given a ration of 4,000 calories a day, so that he could work with the greatest efficiency of which he was capable. In Belgium, when it was occupied by the Germans, the ration provided for was 3,400 calories per head. In the U.S.A., it was estimated that the average civilian ration came to 3,500 calories per head, but that the American soldier consumed 4,500 calories.

What should the ration for the Indian be ? At a rough estimate, a man in India requires on an average 2,500 to 3,500 calories a day, while an Indian woman would require 2,100 to 2,800 calories a day, varying with the nature and amount of the day's work. It would not be ambitious if we were to say that 2,600 calories per head per day would be a fair average to accept. It should not be forgotten that a certain amount of waste takes place in the processes of milling, marketing, storing, cooking, eating and digesting and we should therefore budget for a gross *per capita* intake of 2,800 calories. At this rate, an average Indian would require one million calories in the year. This means that for a total population of 400 million that we have now we require 400 billion (*i. e.*, million million) calories per year.

'That is all very well,' you will think to yourself, 'but it means precious little to me. I want to know how much *food* I should eat, not calories! They sound as if they were nasty, hot things anyhow.' Yours is certainly a reasonable demand and we shall now proceed to talk in terms of real food, of things to eat like rice and wheat, potatoes and mangoes, milk and meat.

4. WHAT THERE IS TO EAT

We have talked so far of constituents of food and of calories. Now let us consider the kinds of foods from which we may draw our sustenance. What are the various foods on which human beings can subsist ? We shall here deal only with those which are the most important. These fall into four groups : (1) food grains, (2) vegetables and fruits, (3) milk and milk products, and (4) meat, fish and eggs.

Food grains are the most important item of India's dietary. They are India's staple food, and people in different parts of the country live on one or other kind of food grain. These include two rather different kinds of grains, which are known respectively as cereals and pulses.

The group of cereals includes rice, wheat, rye, oats, maize, barley and the various millets, like ragi, jowar and bajra. Rice is the staple food of 240 out of the 400 million people of India, being the bulk of the food consumed by people in Southern India, Orissa, Bihar, Bengal, Assam and Kashmir. Wheat is the basic diet of people in Northern India generally. Millets are eaten in most parts of the country, often mixed in varying degrees with rice and wheat.

Cereals do not differ very much among themselves either in chemical composition or in nutritive value. They are all rich in carbohydrates and consequently their calorie

or energy value is quite high. The amount of fat they contain is small. So too their protein content is rather low. The quality of the protein in cereals stands intermediate between that of the protein contained in foods of animal origin like milk or meat, which is very high in quality, on the one hand and pulse protein, which is inferior, on the other. Cereals are also not a very rich source of mineral salts like calcium and iron, though they are fairly rich in phosphorus. Among the millets, however, ragi is exceptional in having a large amount of calcium—about 20 to 30 times as much as rice.

Rice is, in a way, our national food as more people in India live on it than on all the other cereals put together. It is a good fuel for our bodies. When we are hungry, a big dish of rice makes us feel warm and comfortable, and gives us a nice feeling of fullness. Unfortunately rice does not supply enough of several substances the body needs. For instance, it is a poor source of vitamins and of mineral salts, particularly calcium.

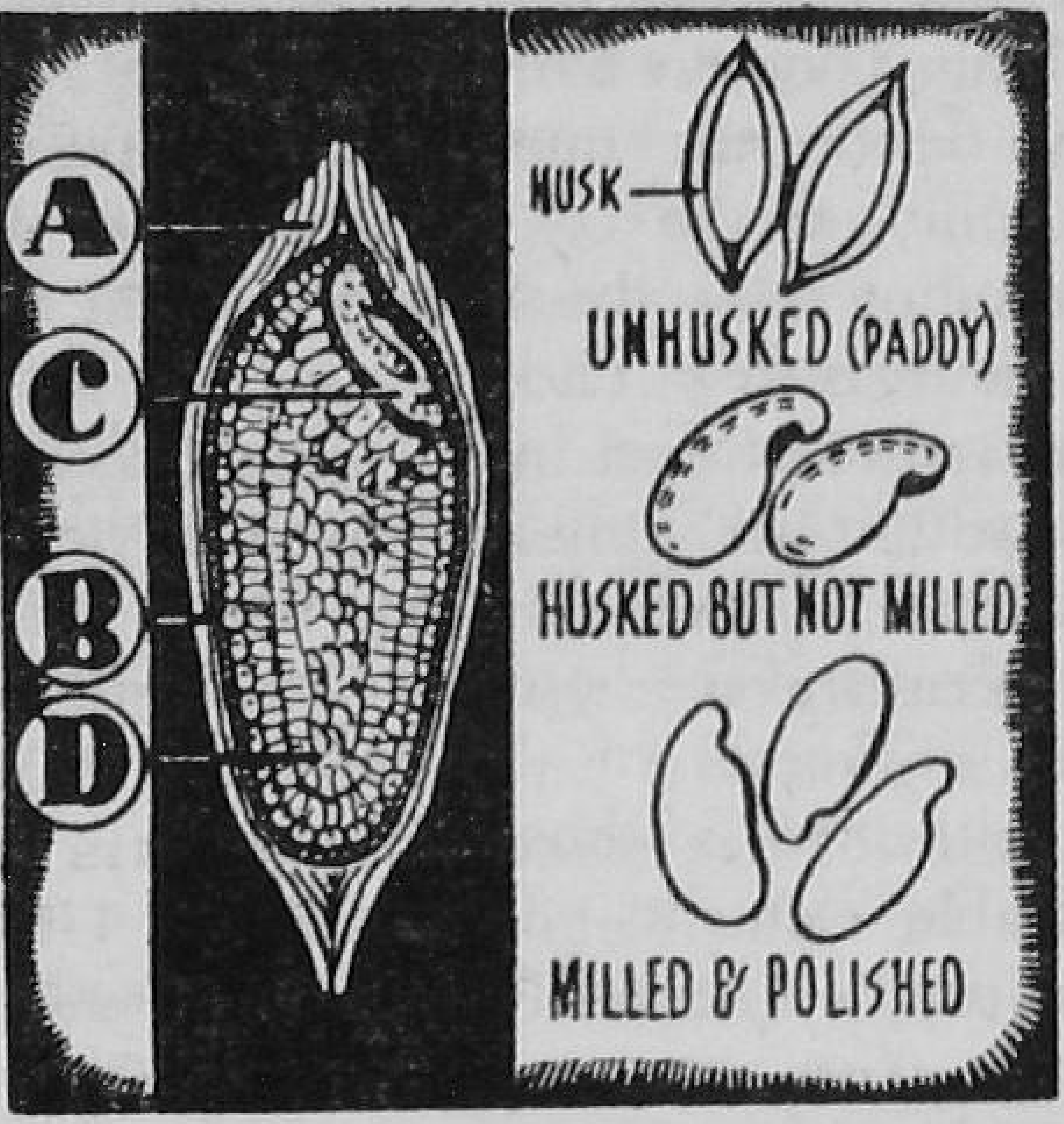
Wheat is not unlike rice, but is in some ways a better all-round food. It has the largest protein content of all cereals, while rice has the lowest. Wheat also has a little more of calcium, and is richer in the B vitamins than rice.

If you try to live on rice alone you will not obtain all the food factors the body needs. Unfortunately, that is precisely what most of our people in Southern and Central India do. Except for the richer classes, the bulk of the Southern and Central Indian population live almost exclusively on rice. In the North, where the staple food is wheat, things are not so bad, because more milk is available at a comparatively cheap price, and the diet is as a result more complete.

Unfortunately rice is not always eaten in its complete state. It is milled and polished and in that process precious elements of protein, vitamins and minerals are

lost to us. Let us see how this happens.

Cereal grains are composed of four parts : the covering or husk, the outer layer or pericarp, the germ or embryo, and the inner starchy kernel or endosperm. Here, for example, is a picture of a grain of rice where the four parts are marked respectively A, B, C and D. Now, let us see how this grain is treated before it reaches our lunch table. First, the covering of husk (A) is removed ; that is no loss, because husk is not really eatable. It is, however, sometimes given mixed with brau to cattle. If we stopped there and ate the rest of the grain it would give us all the nutrition of which it is capable. When rice is hand-pounded, most of it is retained. About 73 per cent of the rice grown in India is pounded by hand. The balance of 27 per cent is taken to a mill where it is milled and polished several times over. The result is that both the outer layer (B) and the germ (C) are removed in the process and only the inner starchy kernel (D) is left. This is extemely foolish, because the germ and the outer layer are richer in the various nutritive elements than the kernel, which is all we usually eat. The kernel is really the food supplied by nature for the growing embryo of the rice plant and is not, therefore, well suited for human beings. What is lost in the process of



milling and polishing is a part of the protein content, about half of the phosphorus, and 75 per cent of the B vitamins.

There is a process which, however, undoes or rather prevents to a large extent the mischief which is done by milling. That is a process which we in India alone seem to have developed, known as parboiling. This means steaming or boiling the rice in the husk after a preliminary soaking. Parboiling splits the husk and makes it easier for the husk to be removed. Perhaps the practice arose in order to make the process of hand-pounding not so laborious. Actually it has a much more valuable use and that is that parboiling diffuses or spreads some of the vital elements of the germ and the outer layer, like vitamin B_1, into the inner core or kernel of the grain. Later when parboiled rice is milled it is thus impossible to deprive it of these valuable elements. Since 58 per cent of the total rice produced is parboiled, this practice is a very good thing. You can see what a calamity we are saved from by this process by looking at what happens in the Northern Circars district of Madras Province. In 1938, about 33,000 cases of beriberi (which, as we saw earlier, is caused by the deficiency of vitamin B_1) were recorded in the Province and of these no less than 98 per cent occurred in this district. The reason is that the people of this district eat rice in the "raw" state, while elsewhere parboiled rice is eaten.

Milling is not the only way in which we lessen the value of rice. In our desire to be clean we wash the rice so many times that we wash away with it about 10 per cent of the protein, 75 per cent of the iron, about half of the phosphorus, and of vitamin B_1 about 60 per cent if the rice is "raw" milled, but only 8 per cent if it is parboiled milled. Then we put the rice to cook and we boil it in a rather excessive quantity of water. When the rice is cooked, the water or *conjee* is thrown away. This again takes with it

what is left of the vitamins. This last waste can be avoided if rice is cooked in a small amount of water and if the water then mixed with curry or otherwise absorbed.

Milling of wheat produces much the same results. *Chapattis* made of whole wheat *atta* are nutritious. Unfortunately the habit of eating white bread made of highly milled *atta* has been spreading in our country.

The second category of foodgrains, pulses, are from the point of view of nutrition rather different from cereals. Pulses are richer in body building materials, *i.e.*, proteins, than cereals, which is why they have been called "the poor man's meat." They also possess more of certain vitamins. Hence it is important that some pulses should be taken by people whose diet is largely made up of milled rice, particularly by growing children. Pulses like grams and dhals are, in fact, eaten by people in all parts of the country. Soya bean is another member of the group, new to India which, produces a heavier crop per acre than any of the cereals. It is claimed that 1 lb. of soya bean has the same protein value as 2½lbs. of meat or 28 eggs. Since it is also rich in fat and contains a certain amount of vitamin A, it should be a valuable supplement to a cereal diet.

A way in which the value of pulses can be enhanced is to eat them after they have been allowed to sprout. When this is done vitamin C is formed in the grain and in the green growing shoots. This is how you do it. You first soak the pulses in water for 24 hours and then spread them out on damp earth or a damp blanket, and cover them over with a moist cloth or gunny bag on which water is sprinkled from time to time. After a day or two, the grains will have sprouted. They should then be eaten raw or after cooking for not more than ten minutes.

Vegetables and fruits do not supply much fuel or energy for our system. That is why a hungry man will not feel satisfied after eating only vegetables. They have, however,

another equally important function, and that is to supply the system with certain vitamins and mineral salts. Most vegetables are rich in vitamin A (in the form of carotene) and vitamin C, which are missing in food grains, and rich also in mineral elements like calcium, sodium and chlorine. That is why vegetables are, along with milk, described as protective foods or balancers. Another function that vegetables perform is that their framework, which is composed of cellulose, provides roughage to the system. Roughage is a term by which we describe that part of the food which does not give nutrition and is not absorbed, but which by its bulk causes a certain amount of healthy irritation in the intestines and makes the bowels move. Lack of roughage can be a cause of constipation.

Vegetables are of three distinct kinds—green leafy vegetables, roots and tubers, and others. The first group called collectively *sag* or *sakh*, includes cabbage, spinach, lettuce and amaranth. These contain plenty of vitamins, particularly vitamin A in the form of carotene and vitamin C. They are also rich in calcium, which is one of the mineral elements most needed by the body. Since rice is deficient in calcium, rice eaters particularly need a certain quantity of leafy vegetables. In recent years, people in the West, particularly Americans, have become great enthusiasts for green leafy vegetables. The Chinese, on the other hand, have always made most extensive use of garden vegetables and have thus made up for their deficiency in animal foods like milk.

The prolonged boiling of green vegetables has an adverse effect on vitamin C, a good proportion of which is destroyed in this process. On the other hand, the eating of uncooked green vegetables is accompanied by the danger of infection, and care must be taken to see that they are properly cleaned before consumption.

Roots and tubers are the potato, sweet potato, carrot,

beet-root, radish, and yam (*ratalu*). The potato is the most popular of this group. It is composed three-fourths of water, and the rest of it is starch. Its protein content is small, but there are some vitamins which compensate for the other deficiencies. The importance of the potato in a densely populated country lies in the fact that it is an economical food. An acre of land under potato will feed twice as many people as an acre of land under wheat. Root vegetables like carrots and turnips have much the same qualities as the potato. They are all rich in starch and vitamin C and poor in protein. Carrots also provide carotene (Pro-vitamin A).

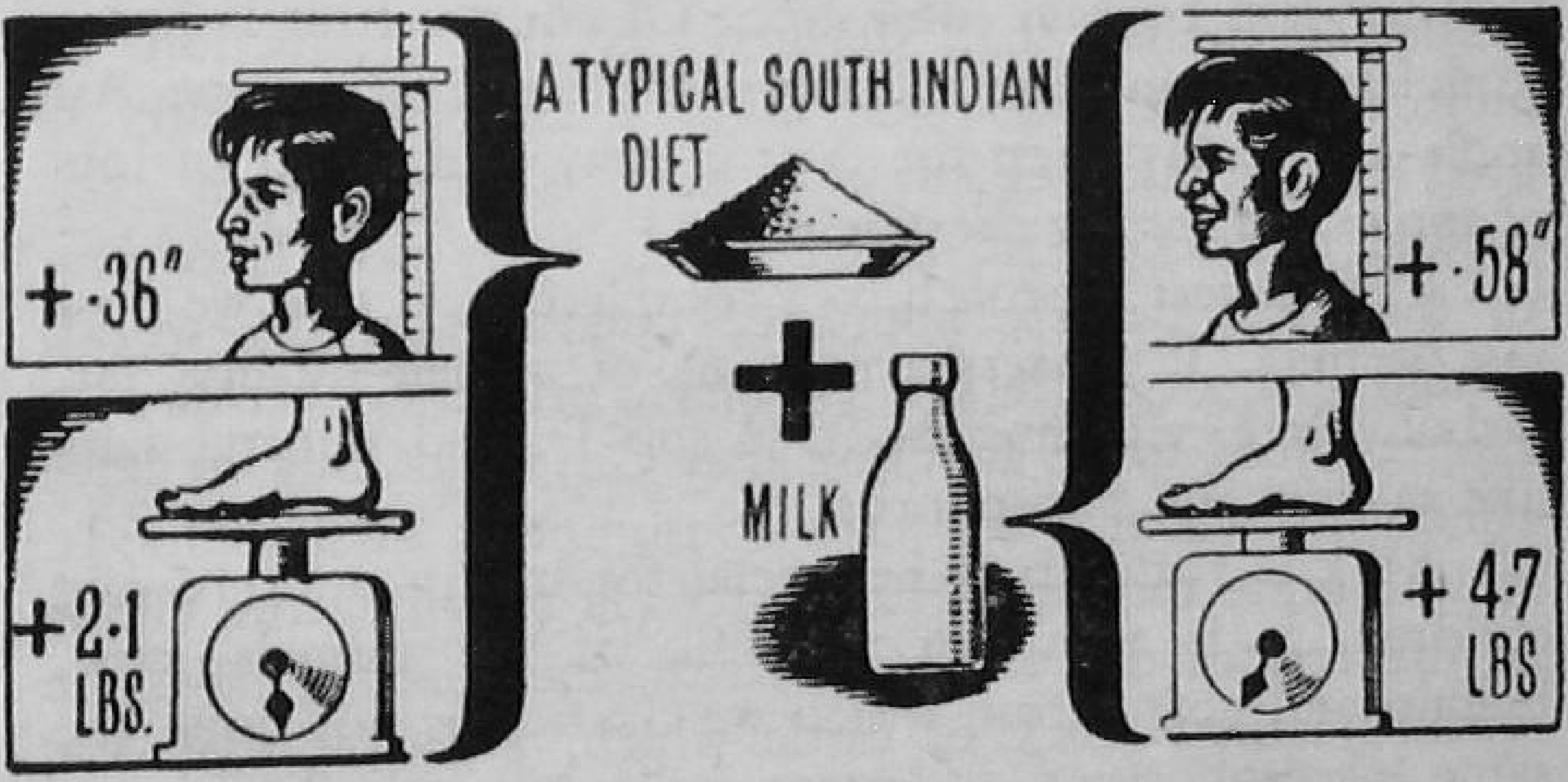
Other vegetables include the brinjal, the vegetable marrow (*doodhi*), and lady's fingers.

Fruits in general resemble vegetables in their composition. They supply vitamins and mineral salts. Citrus fruits (oranges and lemons) are particularly rich in vitamin C. They also contain some iron. Of course, fruit is not a complete food and nobody should try to live on it alone. An apple a day may keep the doctor away, but a diet of lots of apples *and nothing else* would not !

The nearest approach to a complete food that we possess is milk. It possesses proteins of a high quality, fat, carbohydrate, vitamins A, B, C and D, and mineral salts like calcium and phosphorus.

Milk is particularly beneficial for infants and growing children. It is true that the milk of the animals—cow, buffalo and goat—from which we draw it is not quite the same in composition as human milk, but it is the nearest thing to it for a child which has been weaned. In some cases legend has it, as in the case of Romulus and Remus and of Mowgli in Kipling's *Jungle Book*, that infants have been brought up practically from birth on the milk of wolves. Nowadays, attempts are made by artificial mixtures to produce milk which is the same in composition as human milk.

It is not only infants who are dependent on milk. Older children of school-going age show marvellous results when milk is added to their normal diet. This has been noticed throughout the world and particularly in our country. Not long ago, a group of children in South India not far from Coonoor were tested by workers of the Nutritional Research Laboratories over a period of three months. They were divided into two batches, one kept on "typical South Indian diet" and the other fed with the same diet and given in addition 8 oz. of skimmed milk, every day. Skimmed milk, it may be explained, is milk which is left after butter has been extracted from it, losing on the way its fat content and a little of vitamin A. At the end of three months, it was noticed that the average increase in the height of the children in the first group (on typical South Indian diet) was 0.36 inches, while that of the second group was 0.58



inches. Similarly, the average increase in weight of the first group was 2.1 lbs., while that of the second was no less than 4.7 lbs.

That is why in Britain millions of school children have for some years now been given a daily drink of milk free or at low cost. There is no doubt that municipal bodies which spend public money on giving free milk to children

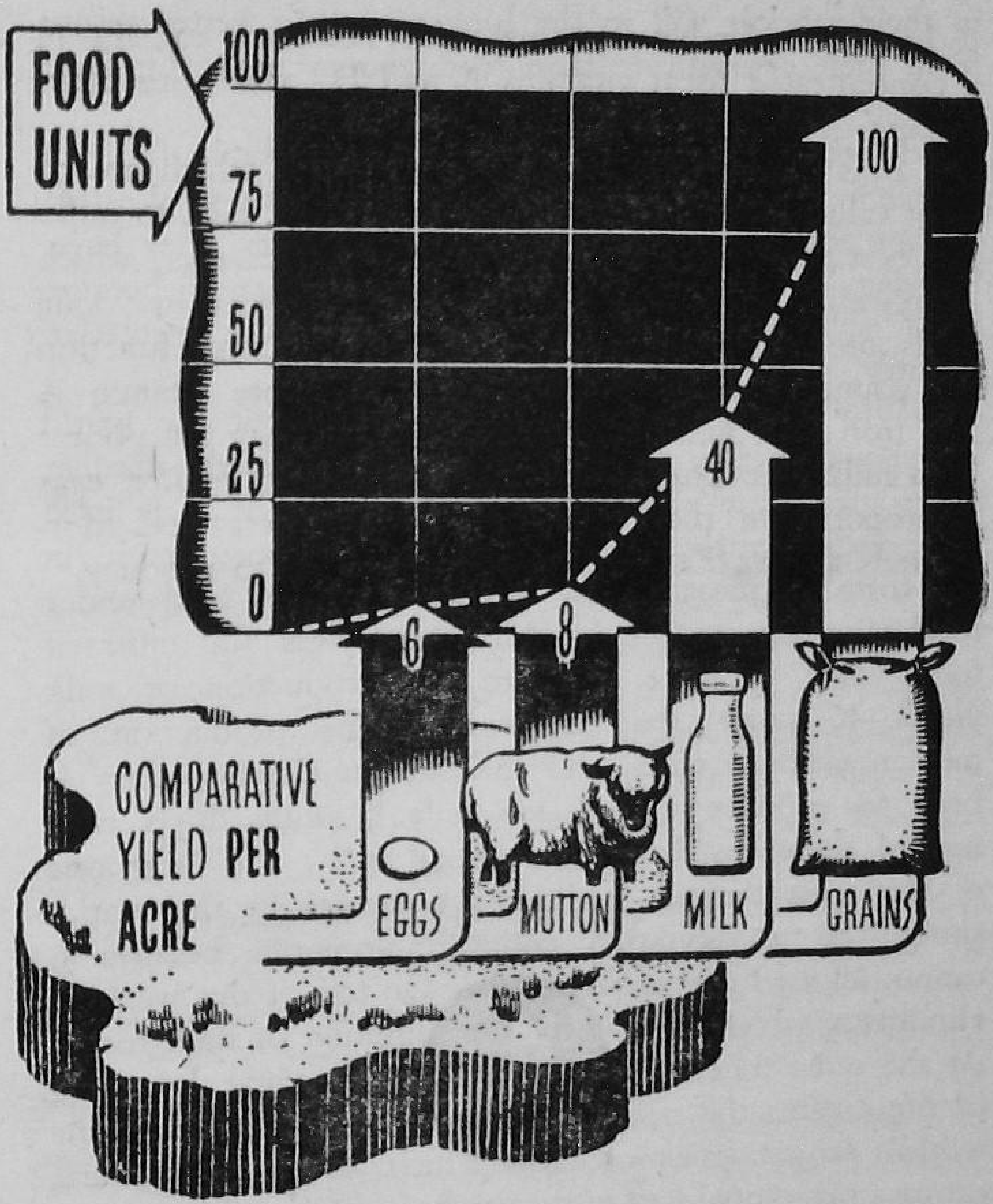
in their schools will in the long run get a better return from their expenditure than from money spent by them in almost any other way.

Meat, fish and eggs are among the staple food of people in many parts of the world, particularly in Western Europe and in America. In our own country, they have, however, a rather limited importance. That is because India is, by and large, what is known as a vegetarian country.

Why is this so ? Experience throughout the world has shown that an acre of land can feed a larger number of mouths if it produces foodgrains than if it is used for breeding cattle, sheep or poultry for consumption in the form of meat. Thus, while an acre of land under foodgrains can in the United States yield 100 units of food value, an acre given to the production of milk yields 40 units, that devoted to the production of mutton yields 8 units, and the one on which poultry is bred to produce eggs yields only 6 units. It is only natural therefore that India, which is by and large one of the most densely populated countries in the world, should be a vegetarian country, primarily because it cannot afford to be anything else. On top of this we have Hinduism, which forbids the consumption of flesh foods. At the same time, the Hindu attitude regarding the taking of life creates the paradoxical situation that we have the world's largest stock of cattle which, ill-fed as they are, eat up a substantial part of the produce of the soil !

While, therefore, mutton and other forms of meat are good food, rich in proteins, they are never likely to form an important article in the diet of the mass of our people.

That objection does not, however, apply in the case of fish, because we have boundless stocks of fish in the sea surrounding our long coast line and also in our rivers, which are there for us for the getting.



Fish is a most valuable food in both its fresh and dry forms because it contains a goodly store of proteins as well as of vitamins A and D and of phosphorus. Small fish, if eaten whole, are rich in calcium also. As these are precisely the elements which are lacking in a rice-eater's diet, fish is of particular value for us Indians.

Liver oil of fish, like the cod and shark, is known

to be of considerable medicinal value, because it contains in a concentrated form vitamins A and D, which are often lacking in a normal diet.

Eggs are another food of animal origin which are of great value. Some people think that they are, next to milk, the best all-round food we possess. In fact eggs, which supply all the elements of food which are needed by young birds, are rather like milk which fulfils the same function for young animals. Eggs possess much more vitamin A and iron than milk. On the other hand, they are poorer than milk in calcium. Here again, as we saw earlier, eggs in proportion to their value as a source of energy are unfortunately among the most expensive of foods to produce.

5. A BALANCED DIET

We often read in books and in articles how important it is to have a balanced diet. What exactly does this mean ? We have already discussed in Chapter 3 the quantity that is necessary for us to eat each day. But eating your full quota in any one kind of food, whether it is sugar or meat or rice, is not the way to go about it. There was once an English doctor who died a victim of his own experiment of trying to nourish himself for a month on a diet exclusively of sugar which supplied him with the requisite number of calories ! It is important that the necessary quantity should be so distributed between different kinds of foods that we get the necessary amounts of *each* of the essential elements of food, *viz.*, proteins, fats, carbohydrates, mineral salts and vitamins. A diet which is so distributed is called a balanced diet.

Each expert on nutrition appears to have his own idea of what a balanced diet should be. Let us see, however, what the Advisory Committee of the British Ministry of Health has laid down in this connection. That Committee commended a diet yielding 3000 calories, made up as follows : 100 g. of protein, of which at least a third should be of animal origin, hundred g. of fat; 400 g. of carbohydrates ; and a certain quantity of minerals and vitamins.

In the following table you will find three balanced

diets. The first column shows a scale which is quoted in the Report of the United Nations Conference on Food and Agriculture as a model diet, and which we may use as a sort of target to aim at. The second column shows a balanced vegetarian diet which nutrition workers here think is suitable for India. The third column shows the corresponding diet suggested for non-vegetarians.

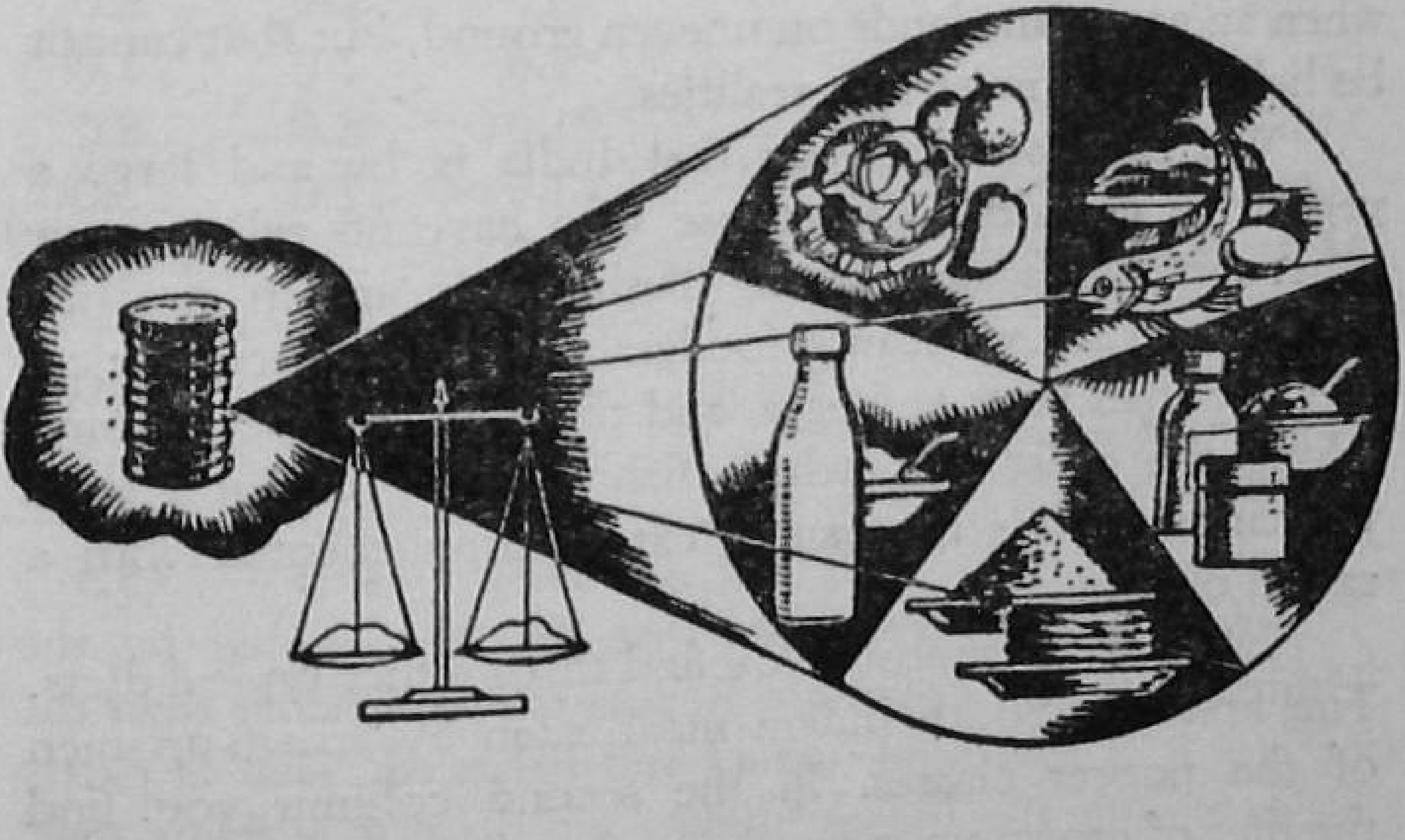
	INTERNATIONAL (Untied Nations Conference)	INDIAN Vegetarian	Non-vegetarian
	oz.	oz.	oz.
Cereals (including a reasonable proportion of wheat) ...	10.0	20.0	20.0
Pulses	...	3.0	3.0
Vegetables (roots & tubers) ...	8.0	12.0	8.0
,, (others, including green) ...	8.4		
Fruits	5.0	2.0	2.0
Fats and oils	2.6	2.0	1.0
Milk	21.0	8.0	8.0
Sugar	1.5	2.0	2.0
Meat, fish and eggs	5.0	...	4.0
Total...	61.5	49.0	48.0
Less 5% for wastage	3.0	2.5	2.5
Net...	58.5	46.5	45.5

You will see from this that the diet quoted by the United Nations Conference Report is much richer than the others. It is also more varied and balanced. That is partly because with the Indian climate we do not perhaps need quite as much food as those living in much colder climates. Also, we are lighter and of sparer build. The United Nations Conference diet, being a model for the whole world, caters

for the needs of all kinds of people living in all kinds of climate. Another cause of the big difference is that, because the Indian people have been forced to eat so little for so many generations, those who do our thinking for us are apt to be rather modest in prescribing model diets for us !

Perhaps the simplest way of describing a balanced diet is to adopt the advice which an American nutrition expert has given :

Divide your food money into fifths :
One-fifth for vegetables and fruit ;
One-fifth for milk, buttermilk, butter and ghee ;
One-fifth for meat, fish and eggs ;
One-fifth for cereals ; and
One-fifth for fats, sugars, spices, and extras.

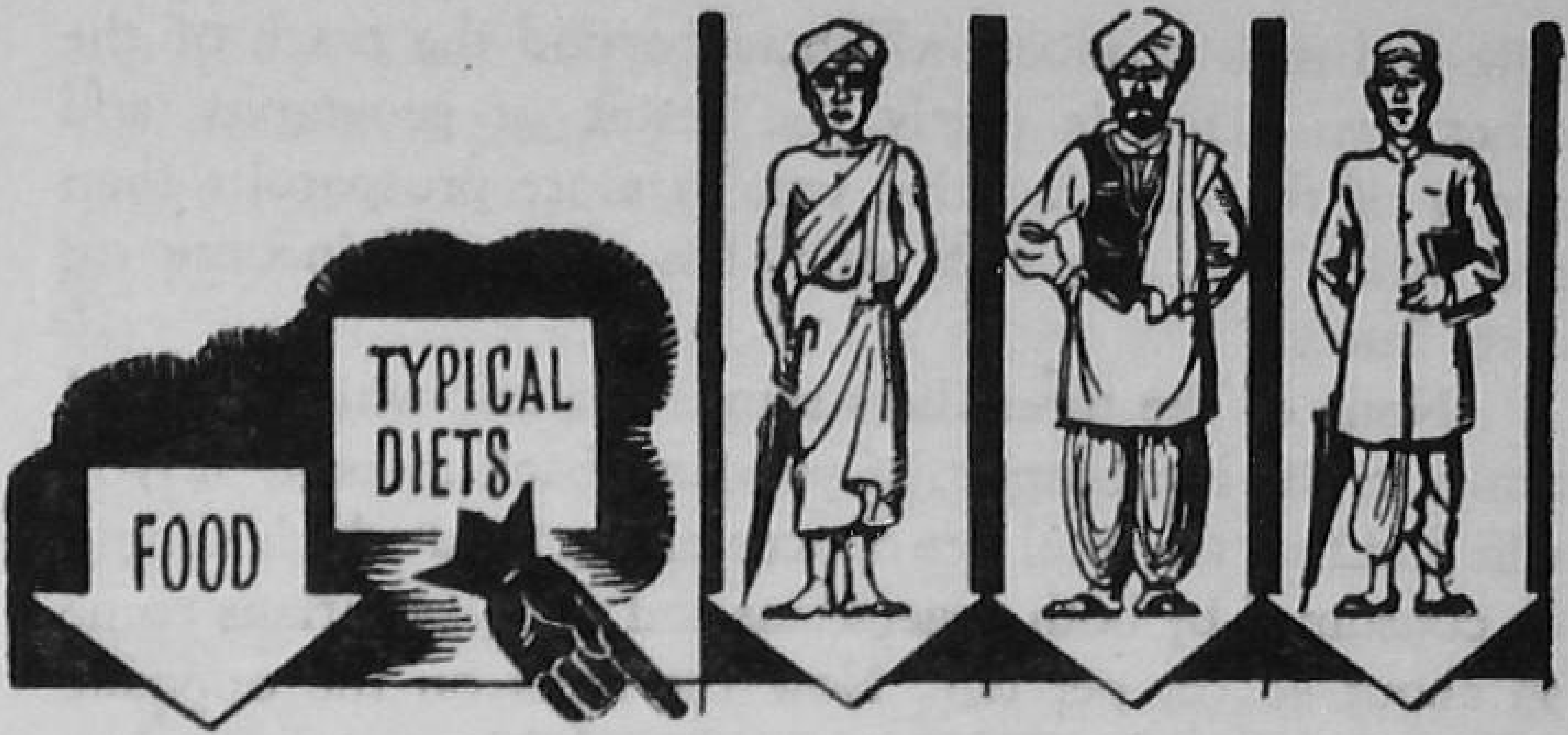


6. INDIAN DIETS

So far we have discussed the kind of food we ought to eat. We have not worried about whether it is possible for us today to obtain such a diet. We have so far been floating in the clouds. Let us now come down to hard earth and see not what we should but what we do as a nation actually consume. This means rather a hard bump as when an aeroplane lands on uneven ground, but that cannot be helped. We must face realities.

We have seen already that India is by and large a vegetarian country. Even those who have no religious or other scruple against eating flesh foods are in practice vegetarian simply because foodgrains are more economical to grow than meat and eggs, and therefore cheaper to buy. Along the coast line, where fish is easily available, this vegetarian diet is to a small extent supplemented with a ration of fish.

In the table opposite you find three rather typical diets. The first is a South Indian meal eaten by grown-up men of the poorer classes. In the second column you find the diet of grown-up men of the poorer classes in Northern India. In the third column you have the diet of lower middle-class Gujaratis in Bombay City :



	oz.	oz.	oz.
Rice	16.0	2.5	3.7
Wheat	...	14.9	5.1
Millets	...	...	1.5
Pulses	1.0	1.4	2.2
Vegetables	2.5	6.7	5.6
Milk and milk products including ghee ...	1.5	3.4	10.8
Fats and oils ...	0.5	...	1.0
Sugar and jaggary ...	...	0.9	1.6
Condiments	0.5	0.2	0.5
Meat, fish and eggs ...	...	0.5	...
Total ...	22.0	30.5	32.0
Less 5% for wastage...	1.0	1.5	1.5
Net ...	21.0	29.0	30.5
=calories ...	1820	2180	1960

If you compare these three columns, you will see how the South Indian diet practically revolves round rice, while the North Indian is equally dominated by wheat. The Gujarati diet in Bombay City is a more mixed one, since it includes both wheat and rice and a quantity of

milk and milk products which is beyond the reach of the other two. That is partly the result of geography and partly of the fact that this type is more prosperous than the other two. We shall study the effects of income on diet later.

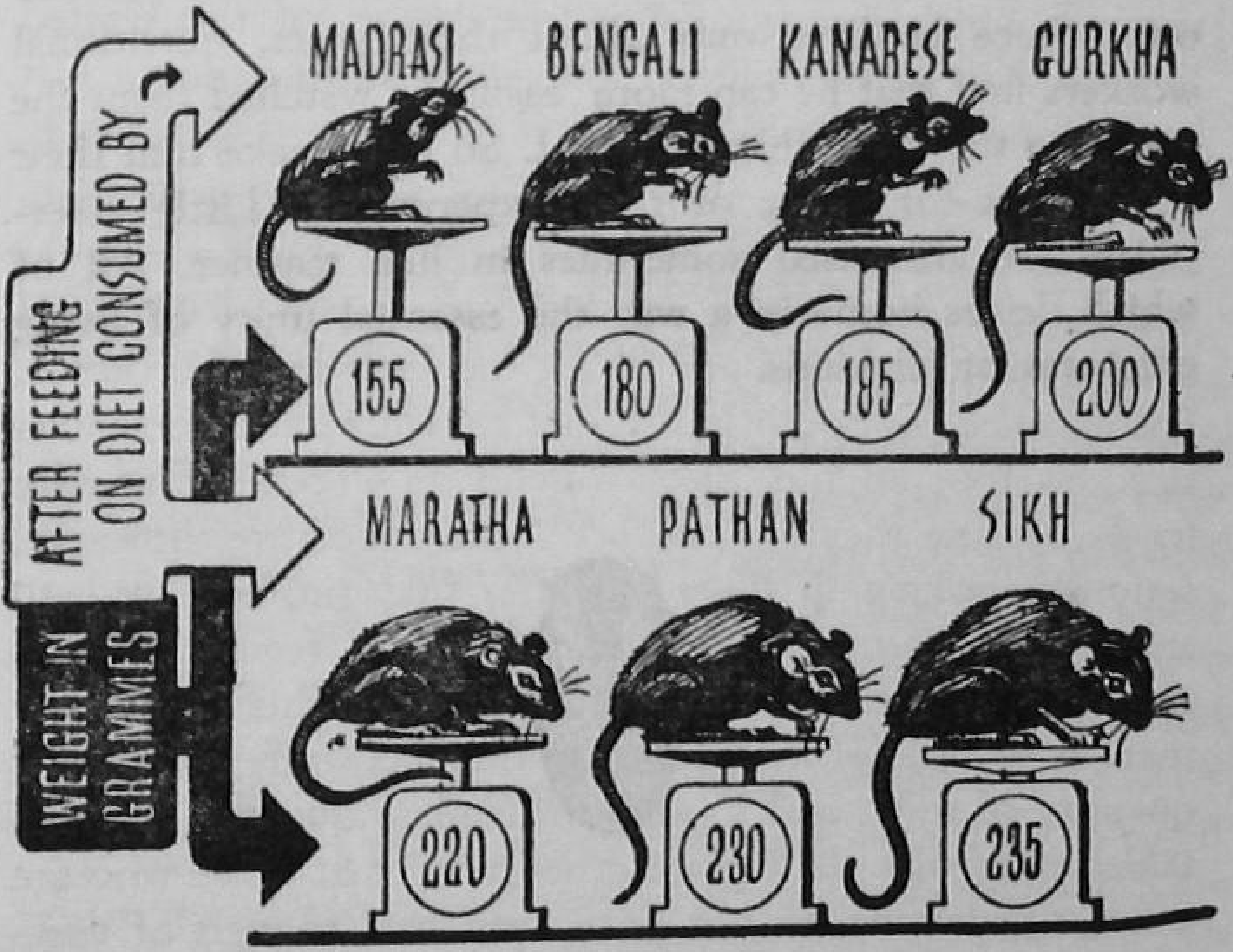
None of the three diets stands the test which we laid down in the last chapter. If you turn back to page 32 you will find that the total net ounces of the food which should be consumed by both vegetarians and non-vegetarians come to about 46 oz. per day. Now the diets on the opposite page amount only to between 20 and 30 oz. in the day. The best of these typical diets gives only 2/3rds of what should be eaten, while the poorer ones yield an even lower proportion. You can see, therefore, what a long way we have to go before we can see our average Indian really eating anything that may be called an adequate and balanced diet. Of course, if one compares these diets with the one which was quoted in the Report of the United Nations Conference on Food, the gulf is so wide that it just makes one's heart sink.

Another thing that we can learn by looking at these tables and comparing them with those in the last chapter is that, apart from eating too little, too much of our food is of a particular kind and much too little of other kinds. For instance, the South Indian diet contains much too much rice. So too, all our diets contain an excess of starchy foods because they are cheaper. Such foods are, however, seriously lacking in those qualities that promote growth and repair tissue, like protein, and in regulating substances, like vitamins and mineral salts. This is because there is so little of flesh foods in our diet, only a very tiny quantity of milk, and a quite inadequate quantity of vegetables and fruits. Is it not a cruel irony that those who are called vegetarians do not have even half enough of vegetables to eat?

The deficiency in milk is perhaps one of the most alarming features of ordinary Indian diets. Here again, the North scores heavily over the South. The Report on the Marketing of Milk in 1943 gives the following figures of average daily consumption in ounces per capita of milk and milk products (butter, ghee, etc.) in the various Provinces :—

Sind	18.0	Hyderabad ...	3.9
Punjab	15.2	Madras	3.7
United Provinces ...	7.0	Orissa	3.4
N.W.F.P.	6.8	Bengal	2.8
Bombay	5.5	Central Provinces ...	1.8
Mysore	4.4	Assam	1.3
Bihar	4.2		

This inequality in the distribution of milk and the contrast between wheat and rice diets account to a large extent for the difference in physique between people in Nor-



thern and Southern India. Several years ago, Sir Robert McCarrison, who was then Director of the Institute at Coonoor, took a lot of rats and divided them into several local groups. He then fed each group with the typical diet consumed by Indians of the kinds which he had selected. Thus, one group of rats was fed on a typical Sikh diet, another on a typical Marathi diet, a third on a typical Madrasi diet, and so on. On the previous page are the results as shown by the average weight in grammes of the different groups of rats.

If you try to take the average weights of human beings of these particular types, you will probably find that they bear somewhat the same relationship to one another as do those of the rats which bear their lablels ! That is because the rat is, like us, an omnivorous animal, that is, he is prepared to eat almost anything that tastes good to him ! The rat also has digestive organs which closely resemble our own. Since he lives only about three years, nutritional workers find that he can more easily be watched from the cradle to the grave than you or I. So they make him their pet animal for many of their experiments. Little caterpillars are also used sometimes in like manner. All of which drives home in a way the essential unity of living creatures of all kinds.

7. OUR SUPPLIES AND THE DEFICIT

We have seen how far away the typical Indian diet or diets are from an adequate and balanced diet such as our people should have. The reasons for this cannot lie only in the ignorance or perversity of our people. There must be more deep-rooted causes why we should be eating neither the right things nor enough. Perhaps we shall get to the right answer if we examine our supplies of foodstuffs and compare them with our wants.

Unlike England and many other countries which depend for a large part of their food supplies on other countries, we Indians are almost entirely dependent on ourselves in this respect. What we buy from, and sell to, other nations is almost negligible. It is true that before the present war broke out we used to import a certain amount of rice from Burma, Thailand and Indo-China, but when we examine the figures we find that these imports amounted to no more than four or five per cent of our rice supplies. All the rest we grew for ourselves. So also we used to export only one per cent of our rice production and three per cent of our wheat production to other countries. You may think I have forgotten things like jam, butter, cheese, peaches and prunes which come into this country in tins. I have not mentioned them simply because they are such a tiny quantity against the background of our problem and because only an infinitely small number of well-to-do people can afford to buy imported tinned foods. In any case our imports

and exports, small as they are, cancel out. So you see that India is practically self-contained in the matter of food. Unfortunately, as we shall soon discover, that is not the same thing as saying that it is self-sufficient.

In order to assess our food supplies we have to find out how much we grow or produce of various kinds of foodstuffs. The trouble here is that we have little information and what there is is not very reliable. It is generally admitted that the statistics (which is a big word for figures) supplied by the administration are not very accurate and can often be very wide off the mark. When the Government of India wants to find out how much rice or wheat is grown in this country, what it does is to multiply the area under that particular crop by an average figure of the yield per acre. Both factors are extremely hazy. Thus, in the case of some provinces like Bengal, Bihar, Orissa and Assam, the areas under various crops are known only very roughly. As for the Indian States, which are scattered all over the country, nobody seems to have the faintest idea, in the case of the greater number of them, how many acres are devoted to a particular crop. The result is that the published figures give information about only 2/3rds of the country. For the rest, we have to rely on guess-work. Things are even worse when the Government turns to estimate the yield per acre for every cultivated crop. This is assessed on the basis of reports received from the provinces, which in turn depend upon the reports from the districts, which in turn rely on the estimates of village headmen in the 656,000 villages in our country. Since the village official is the foundation of this huge structure of guess-work, it is clear that by the time we reach the apex of the pyramid we might be very far out. It would be true to say therefore, that Government statistics are more "guestimates" than estimates and all that can be deduced from them are trends rather than facts. All

the same, we have to work with the material at our disposal. So let us see what, according to the official figures, we produce in the way of the various things we eat.

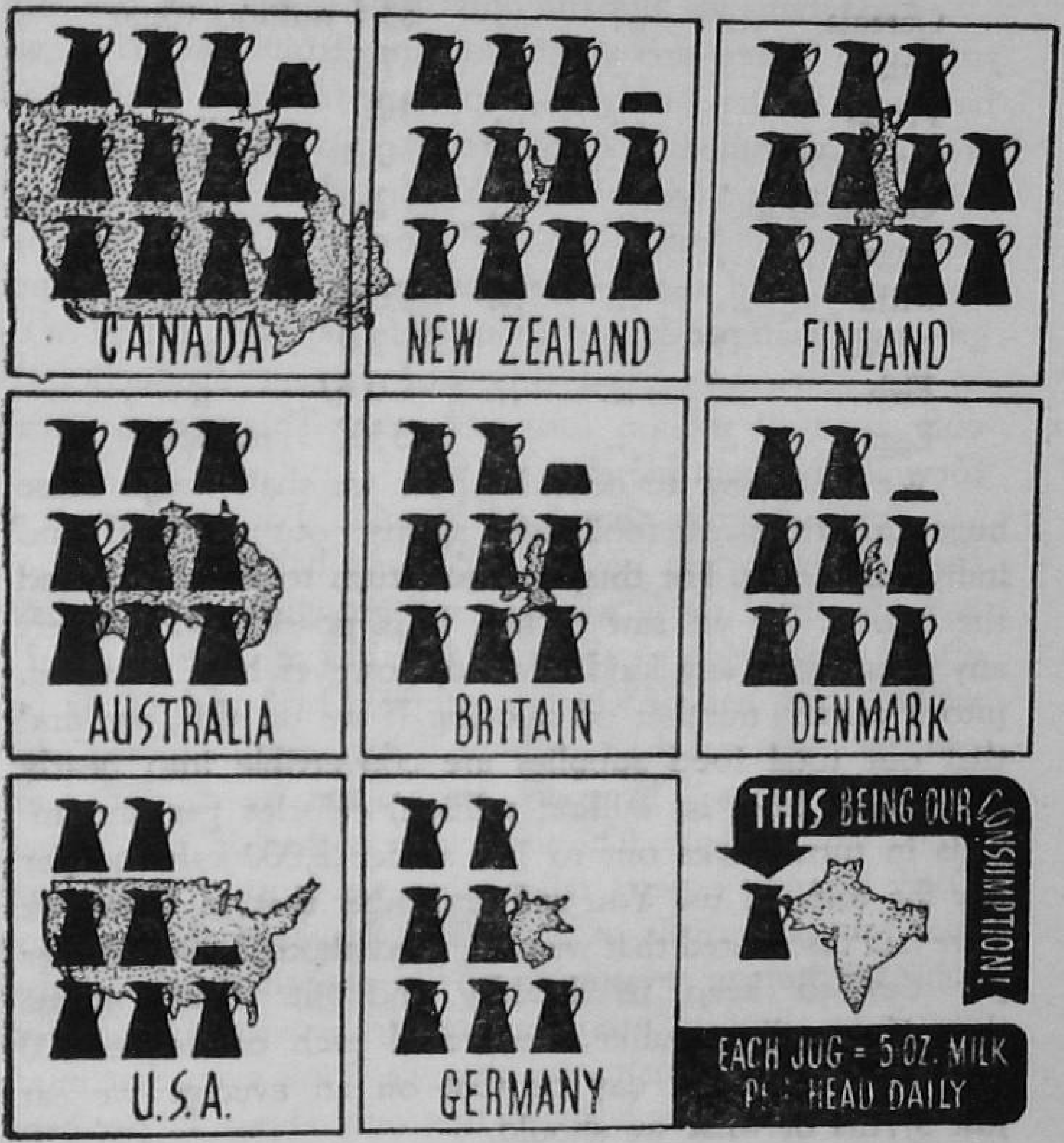
First of all let us have a look at the position in regard to our staple food—cereals. Judging by the latest figures available, we produce about 29 million tons of rice, 10 million tons of wheat, 2.5 million tons of barley, and 19.5 million tons of millets, making in all 61 million tons in the year. This is not all available for us because we have to set apart a certain portion (say $12\frac{1}{2}$ per cent) for use as seed and for wastage. That leaves us with about 53.4 million tons. As against this, what are our needs ? We saw in Chapter 5 that a grown up person needs on an average $1\frac{1}{4}$ lb. of cereals daily. Women and children may need a little less. A rough and ready calculation for converting the total population into adult males is to take three-fourths of the former. On this basis we need $(5/4 \times 3/4 =)$ 15/16 lb. per head of our total population. This comes to just over 61.1 million tons. We thus find that we are 7.7 million tons short of cereals. It should be remembered that all this is on the basis of our people getting the vegetables and milk and other things that a balanced diet calls for. At present the bulk of our people exist on foodgrains and little else. Under such conditions, a grown-up man requires more than $1\frac{1}{4}$ lb. This means that our real deficit today is very much in excess of what has been shown above. People who claim, therefore, that as things are today we are short by anything between 10 and 20 million tons per year in the way of cereals are not very wide off the mark.

Pulses also show a marked deficit. Our total production is 8.5 million tons. Again allowing for seed and wastage, we get about 7.5 million tons available. Since we saw in Chapter 5 that a grown-up man needs 3 oz. of pulses a day, our total requirements are 9.3 million tons, showing a deficit of 1.8 million tons.

Foodgrains are not the only thing to eat that our soil produces. There are vegetables and fruit which, as we have seen earlier, are quite important for good health and are therefore called protective foods. To make a balanced diet, 12 oz. of vegetables are needed daily by those who are vegetarians and 8 oz. by those who are not. This gives us a total requirement, at an average of 10 oz. per grown up man per day, of about 30 million tons for all of us in the year. As against this, our present production is only about 9 million tons per year. This means a call for a 250 per cent increase.

Another protective food is milk. For children it is the most important kind of food, and half our population is made up of those who are still growing. Here we have a total production of about 6,200 lakhs of maunds or 22.1 million tons, half of which is supplied by buffaloes, 47 per cent by cows and the remaining 3 per cent (including what Gandhiji drinks !) by goats. Here again we cannot, I am afraid, lap it all up. The first claim is that of the calves. Dairy farming experts tell us that we must allow 15 per cent for these rivals of ours. That leaves us 18.8 million tons for human consumption. By the time it is shared evenly by all of us, it comes down to between 4½ and 5 oz. per day. That is not to say that we drink even that much on an average. It is believed that only about 27 per cent, or just over a fourth of the milk available, is drunk in that form. The rest is used for various preparations like *ghee* butter, *mawa (khawa)* and *dahi*.

Now how does all this look against the background of our needs ? When the United Nations Conference on Food and Nutrition met in America in 1943, it recommended a diet which included a ration of 21 oz. of milk for each one of us. In case you think that a very ambitious recommendation, just see how much an average person in some other countries consumes.



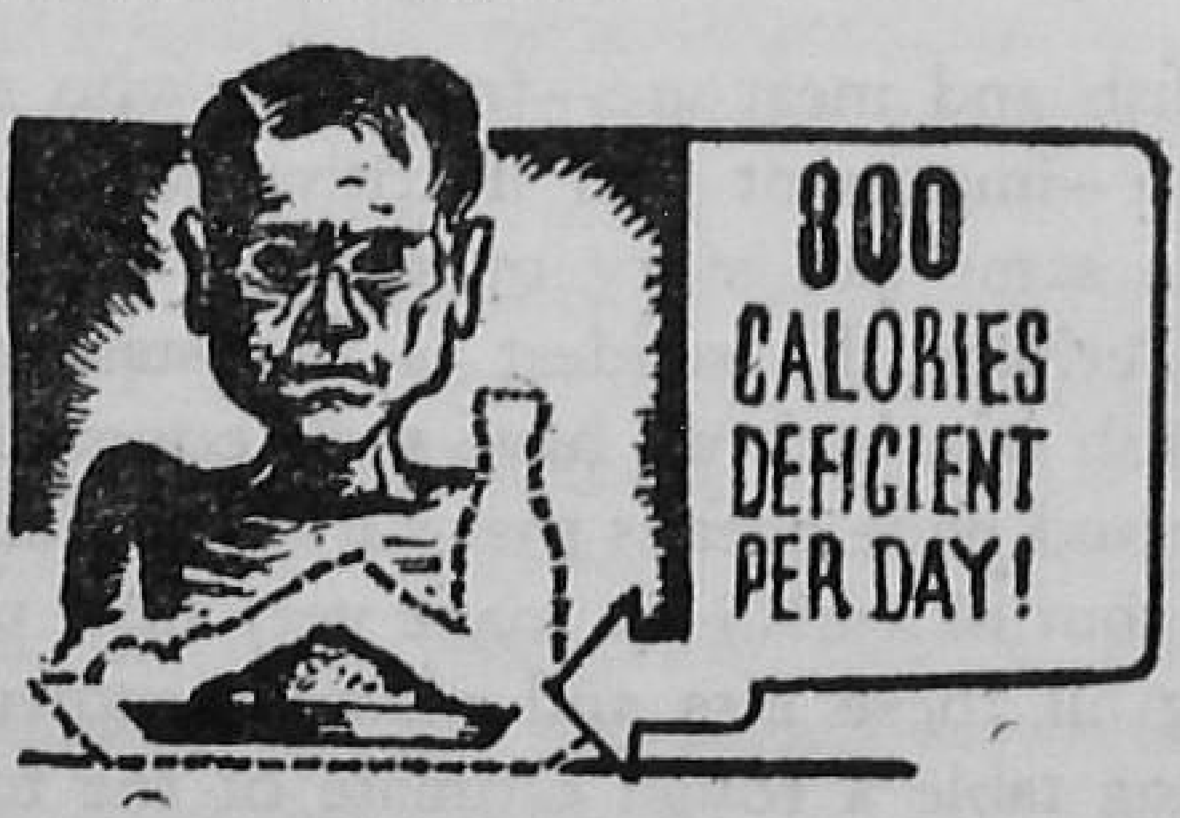
Eggs, fish and meat are—for those who are prepared to eat them—important and nutritive foods. Here again there is the same sad story of supplies falling far short of needs. Perhaps the saddest is the state of affairs in respect of fish of which we have such boundless resources in the deep and wide oceans that surround our country on three sides, but of which we make very little use.

Putting all these bits and pieces together, we get in the following table a rough estimate of the total supplies

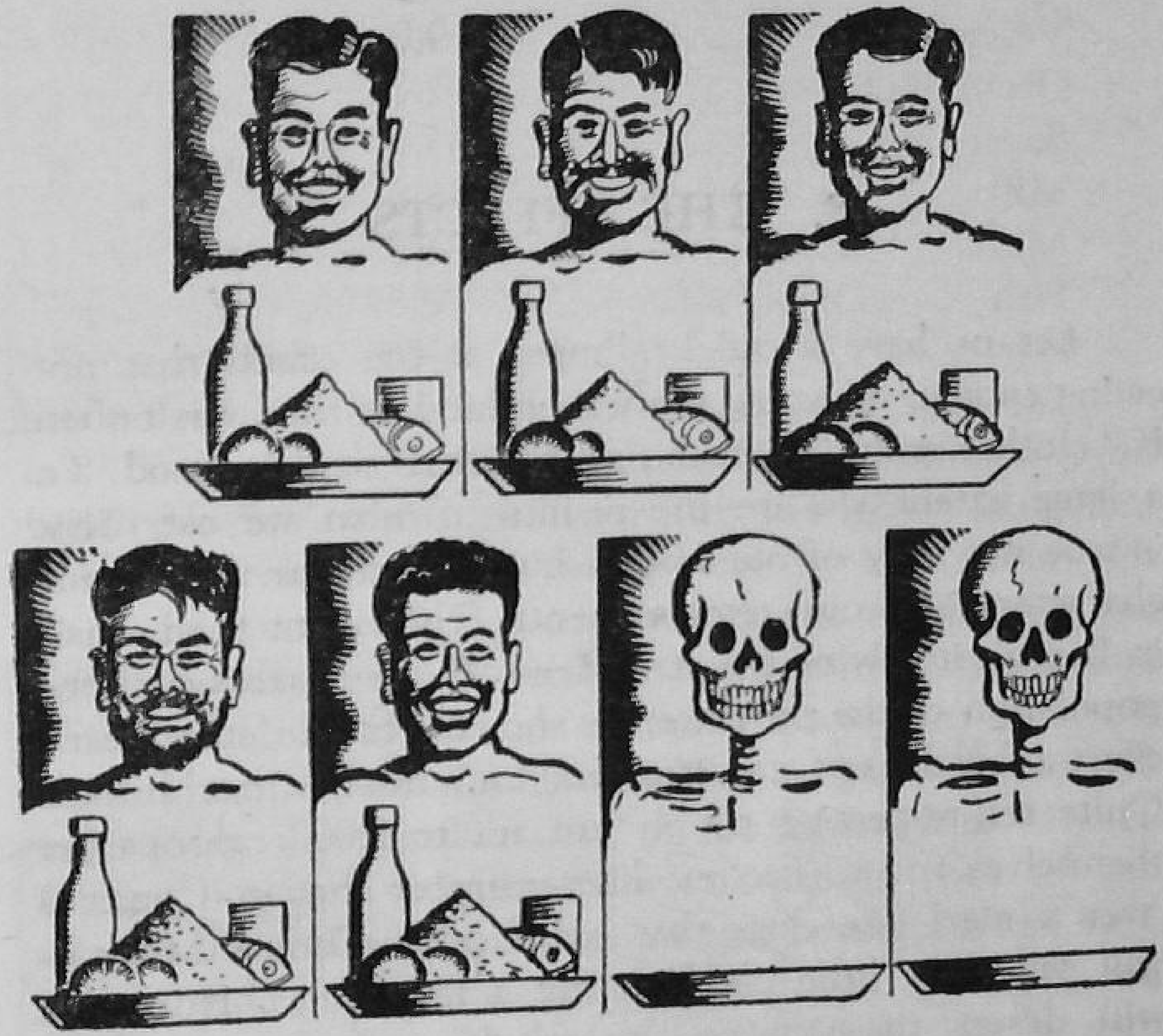
available of our main heads of foodstuffs :—

Cereals	53.5	million tons.
Pulses	7.5	,,
Fruits	10.7	,,
Vegetables	9.0	,,
Groundnuts	2.0	,,
Sugar	5.0	,,
Milk	18.8	,,
Meat	1.0	,,
Fish	0.67	,,
Eggs	3300	million

We have now to consider how we shall weigh these huge quantities of foodstuffs against our national and individual needs. For this, we must turn to our old friend the calorie. As we saw earlier, it is possible to convert any quantity of any kind of food, however huge or small, into a certain number of calories. If we do this, we find that our total food supplies are convertible into nearly 290 billion (that is, million million) calories per annum. This in turn works out to just under 2,000 calories per day for each of us. You will remember that in CHAPTER 3 we had discovered that we each need about 2,800 calories per day to keep us healthy and fit. This means that, if we all ate alike, we would each of us be 800 calories short every day or that on an average we eat just 5/7ths of what we should.



It means that if we were to decide that all Indians should eat an adequate and balanced diet, *there would be no food at all for about* 115 *million of our people.*



8. THE EFFECTS

Let us have a quick glimpse at the effects that not eating enough or eating the wrong kind of food has on us. If 'clothes make the man', much more so does food. To a large extent we are the results of what we eat. This is true not only of our bodies but also of our minds, our characters and our temperaments. The recent food crisis in Bengal, involving the starvation of a large section of the population of the province, has shown what a demoralising effect a few days of starvation has on normal human beings. Quite self-respecting people are apt to lose control over themselves and to become like animals. They will quarrel over a meal like dogs that scrap over a bone. Mothers will sell their little children for a few annas. Husbands will desert their wives. In other words, an ordinary man will often go to pieces if he is starved beyond a certain limit.

On the other hand, see what happens to an ordinary village boy, the son of an agricultural labourer—famished, clothed in rags, rather subdued, and too servile to stand up like a man against a well-to-do or an educated person or even a petty official. Recruit the same boy into the army, put him in a uniform, give him a proper ration of food to eat for a few weeks or months and, at the end of it, you have transformed him into one of the finest and bravest of soldiers in the world.

Is it any wonder then that the chronic starvation of which our people have been the victims for many generations has sapped their sense of sturdy independence and made it difficult for them to assert their right to free nationhood ? As much as our internal divisions, perhaps, it is this under-nourishment that keeps us from asserting ourselves and securing for India a free and equal position among the nations of the world.

Inefficiency and slackness are other results produced by the same cause. People often complain that the workers in our factories and the peasants in the fields are lazy and inefficient.

Such complaints are largely correct. It is said that while an average miner in the U. S. A. produces 589 tons in the year, while in England he produces 300 tons and in

Germany 243 tons, the average Indian miner produces only 80 tons. This disparity could be illustrated by examples from other industries. Partly at least this can be put down to the factor of malnutrition.

Efficiency and independence are not possible for an unhealthy people. That is why the ancient Romans had a tag—*Mens sana in corpore sano*—which meant a sound mind in a sound body. But a sound body and good health are impossible without a nourishing diet. We have already seen how deficient in nutrition is the diet of the people of

our country. This results in their being subject to many ailments and diseases. That does not mean that malnutrition is the only cause of low health. There are other factors that also contribute to the high incidence of disease and to our low vitality. For instance, there is insanitation and the absence of an adequate public health administration. Then there are bad social institutions like child marriage and the purdah. Malaria is another major scourge. But to a large extent we would be justified in saying that our C3 population is a result of bad feeding.

We have already seen in chapter 2 how important are various elements of diet, like vitamins and minerals, and how their absence causes all kinds of diseases.

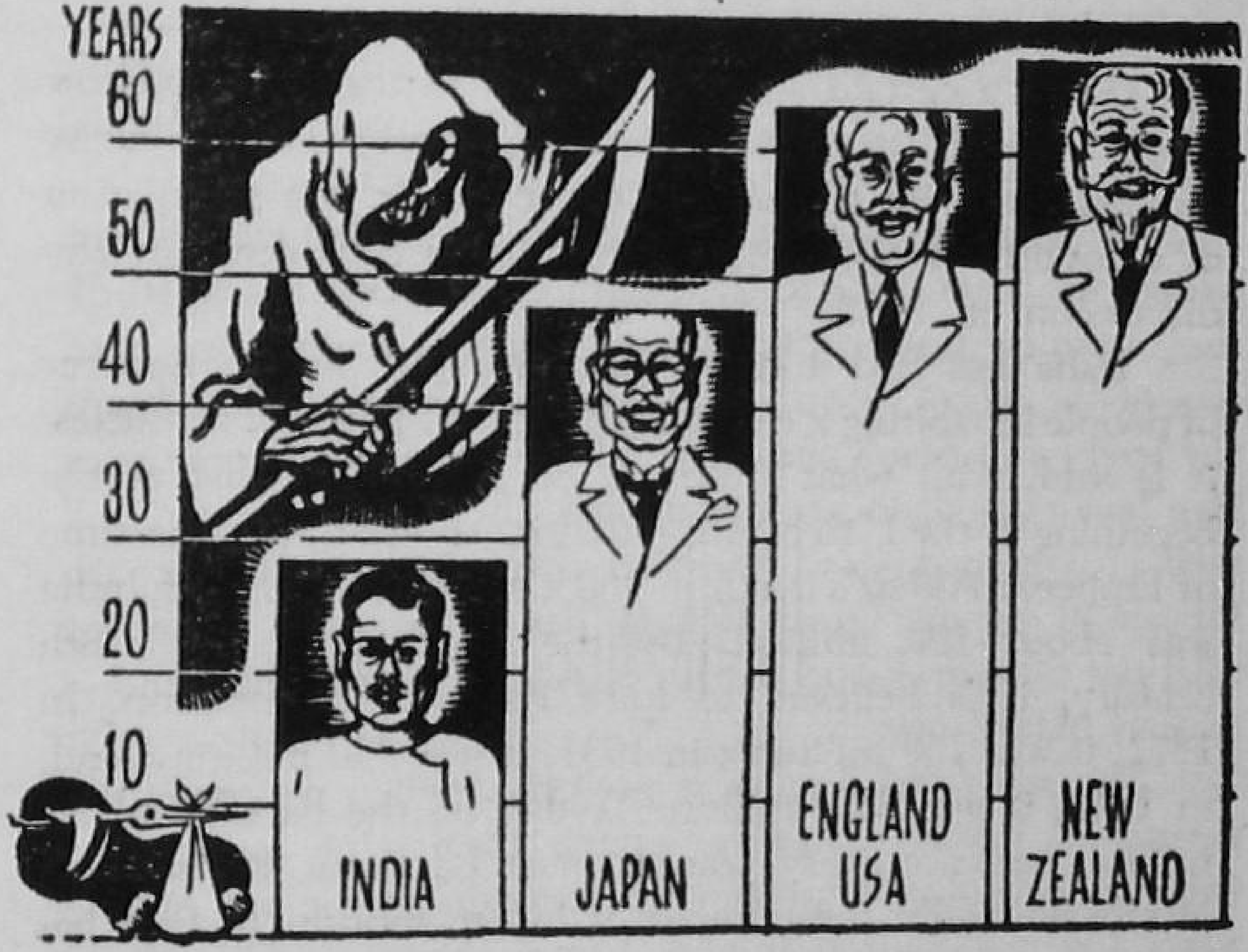
Perhaps the clearest way of realising what insufficient or bad food has done to the health of our nation is to study the mortality rate in our country. In this respect, we have one of the worst records in the world. Our mortality figure for every thousand person is 22.4. Other Asiatic countries like Java and Japan are not as bad, their figures being 18.8 and 17.0 respectively. Western countries, of course, are far ahead of us. Great Britain has a mortality figure of 12.4 per thousand, and the U. S. A. of 11.2 per thousand—exactly half of ours.

The same sad picture is presented when we study the figures of infant mortality—which means the number of infants born alive who die before attaining the age of one year. Over a million infants below the age of one year die annually in India. Our infant mortality rate is 162 for every 1,000 children born. As against this, in Japan it is 106 and in Great Britain and the U. S. A. only 58 and 54 respectively. It is estimated that half the total mortality in India recorded in any year occurs among children under the age of ten.

The number of women who die in child-birth is also higher in India than in almost any other country in the

world. For every 1,000 cases of childbirth, nearly 24 mothers die. It has been estimated that at least 200,000 women die in childbirth every year.

The result of all this is when an Indian baby is born, it has on the average the right to expect to live for only 27 years. In Japan, the average expectation of life is 47 years, in England and the U. S. A. 62 years, and in New Zealand it is the highest in the world, namely, 67 years.



9. TOO MANY MOUTHS ?

Given a certain amount of food in the country, how much we each have to eat depends largely on how many mouths there are to feed. In other words, the population of a country is one of the factors to be considered in any discussion on food.

India has had a tremendous increase in the number of people inhabiting it over the span of the past few centuries. It is said, with what truth we do not know, that at the beginning of the 17th century, that is, round about the time of Emperor Akbar's death in 1605, the population of India was about 100 million. By the middle of the 18th century, it is believed to have risen to 150 million. In 1872, it was 206 million ; in 1931, it was 350 million ; and, in 1941, it was 389 million. To-day on the basis of a five million increase every year, it must be about 405 million. While no doubt the number of Indian mouths to feed has gone on increasing at a good pace, it would be wrong to think that we alone of all the peoples in the world have increased in number. Indeed, our rate of increase appears quite modest when compared with that of several other countries in the last half-century. Between 1870 and 1930, our population increased by 30.7 per cent ; that of England and Wales went up by 77 per cent ; that of Japan by 113 per cent ; and that of Russia by 115 per cent. But these countries were able to feed their surplus population,

partly because they had colonies or spheres of influence to exploit and partly because they were highly industrialised and economically developed countries. We in this country are very differently placed in these respects, and so we cannot afford to emulate their example. Nor can we afford the present high cost of such increase in terms of the avoidable death of one out of every six new-born babies and the sufferings of men, women and children alike.

The only way in which India can manage to feed an increasing population is by producing more food. Has not our food production then been increasing alongside our population ? There seems to be a certain amount of difference of opinion as to who is winning the race between population and food. On the one hand, we have Professor Radhakamal Mukerjee who in *The Food Supply* says that if we take the figure 100 as representing both the population and the food supply for the period 1910-11 to 1914-15, the index for food supply stood in 1937-38 at 118 while that for population had gone up to 125. In other words, food had lost in the race. As against that, Kate L. Mitchell in her book *India Without Fable* claims that "between 1910 and 1930, population increased by about 17 per cent, food production by about 30 per cent." P. J. Thomas and N. S. Sastry in their *Indian Agricultural Statistics* calculate that with population and agricultural production at 100 in 1920-21 to 1921-22, population had increased by 1934-35 to 1935-36 to 115 while agricultural production had gone up to 121. All this is rather mystifying, until we remember that the figures of food production in India are so unreliable that you can prove almost anything with their help !

It is estimated that on an average about 0.86 acre of cultivated land is available per head of population in British India, and the figure for the country as a whole would not

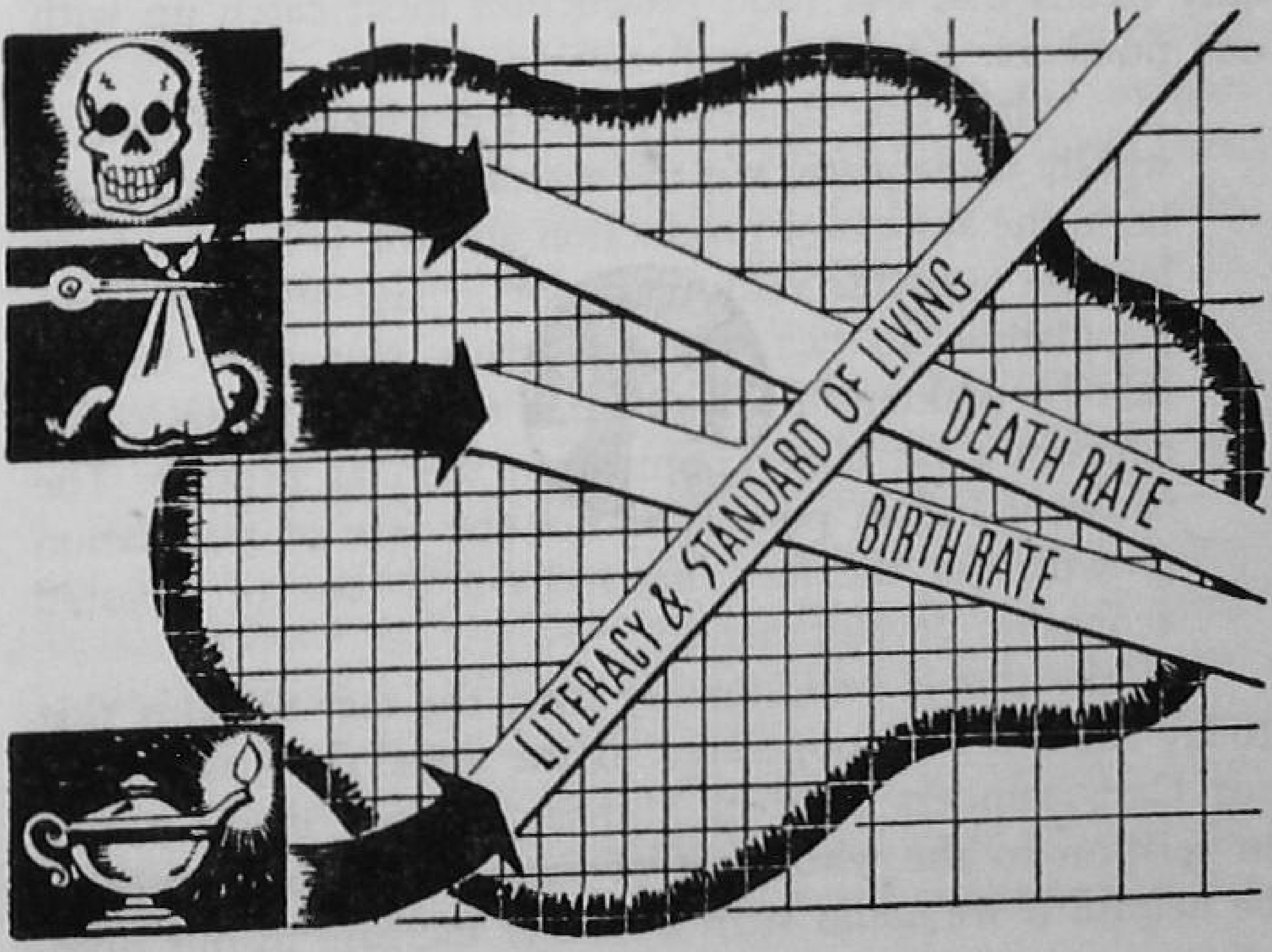
be substantially different. As against this, it has been calculated by experts in America that 3.1 acres per head are required to produce a 'liberal diet,' while even for what is called an 'emergency restricted diet' 1.2 acres of land per head are necessary. In the light of these figures, it is clear that the ratio $\frac{\text{cultivated area}}{\text{number of population}}$ is distinctly on the low side in India. Is this ratio increasing or decreasing? Though the evidence is conflicting, one would not be far wrong in concluding with Dr. W. R. Aykroyd in his pamphlet *Nutrition* that "the available evidence suggests that the area of land under cultivation is not increasing proportionately to population growth, so that the ratio is decreasing."

This does not mean that the ratio is decisive—for we have by no means exhausted either the limits of cultivable land or the possibilities of the land already under the plough. Nor does it mean that the chronic starvation of the people of India is caused by over-population. It only means that our food production must catch up with our numbers. Kate Mitchell rightly says:

> "It is true that the present production of food is wholly inadequate, but the reasons for this inadequacy lie in the system of production and the failure to develop the available resources, not in any absolute over-population. In fact, there is every reason to believe that by making full use of her resources, India could support a far larger population than at present. The cause of Indian poverty is not the rate of population growth, but the fact that India is a case of arrested economic development."

While this is undoubtedly true, the fact remains that today India *is* over-populated in the sense that, as Professor Carr-Saunders puts it, "there are too many people in relation to the whole set of facts." It would probably be helpful if we could stop a further increase in our num-

bers by methods of birth control, until we have put our agriculture on a sound footing and altered ' the whole set of facts.' Unfortunately, of the two tasks, the former process is, owing to the ignorance and poverty of our people, much the more difficult to effect. While therefore birth control facilities should become part of our public health services, our main and, in fact, our fundamental task is to increase our production of food till it suffices to feed our people. How much does that mean ? We have already glimpsed the answer in CHAPTER 7 where we saw that we are producing only 5/7ths of the food we as a nation need. An over-all increase of 30 per cent in our food production would therefore enable us to catch up with our present population. If we still want to go on increasing beyond that number at the present rate, our food production will also have to go on increasing correspondingly. Is all that impossible ? It may be difficult but, as we shall see in the next chapter, not impossible.



Experience in other countries has shown that, with a rising standard of living and increase in literacy, the birth rate tends to fall, presumably through the use of methods of contraception filtering down to broader and broader sections of the people. There is every reason to believe that such a process would be evident in India also, once economic development takes place. By the time a plan such as the *Fifteen Year Plan of Economic Development* has been given effect to, it will be much easier, with a literate and more prosperous people, for measures to be taken which will bring down our birth rate and our death rate as well as the rate of increase in our population. It will then be possible for us to control what H. G. Wells has described as "the breeding storm" and to aim at quality rather than quantity.

10. MORE FOOD

Quite apart from the need to deal with the permanent food shortage, efforts have been made, both in India and abroad, to grow more food to meet the acute shortage caused by the war. England in 1938 produced only 40 per cent of the food it consumed. As a result of production drives, it was 60 per cent self-sufficient in 1942 and 75 per cent self-sufficient in 1943—truly a remarkable advance. In India too the Government initiated a "Grow More Food Campaign," and it is claimed that some 5 million acres of land have so far been diverted from the cultivation of cotton to that of food crops and that another 3 million acres which were lying fallow or uncultivated have been brought under food crops. In spite of the increased area under crops, however, the actual production of foodgrains, like rice and wheat, has not noticeably increased in the war years. This is in painful contrast to the striking results achieved in England. There are several explanations for this contrast. One is that a higher proportion of land—over 40 per cent—is already under cultivation and it is extremely difficult to increase that by even 2 or 3 per cent. Another reason is that people here have not responded with the same enthusiasm as those in England to the call for greater food production. This is due to the fact that the relations between the people and the State are not the same in the two cases and that the government here lacks

the same organisation and drive and has not been willing to subsidize the producer of food to the extent that the government in England has done.

There is no reason, however, why, given the proper incentives, the production of food in India should not be doubled or trebled in a few years' time. *The Fifteen Year Plan of Economic Development* stipulates an increase of 130 per cent over the present production. The Memorandum of the Imperial Council for Agricultural Research on the Development of Agriculture and Animal Husbandry in India provides for an increase of 50 per cent in 10 years and another 50 per cent in the next 5 years, that is, a doubling of the present production in 15 years. While the *Fifteen Year Plan* thinks that a capital expenditure of Rs. 1,240 crores will be required to achieve its aim, the official Memorandum provides for a capital expenditure of Rs. 1,000 crores. Since one does not produce food by sowing in the soil coins or currency notes as if they were seed, it is worth considering the ways in which we can invest these huge amounts in agricultural development so as to produce an adequate food supply.

There are, to start with, two lines of approach. One is to increase the area under cultivation to the maximum extent. The other is to grow more on the land under the plough. The first calls for more extensive cultivation, the second for more intensive cultivation.

The total area of land in India is about 1000 million acres. Of this about 360 million acres are at present sown with crops, about 80 million acres are kept as fallow, while some 170 million acres are cultivable waste—that is, land which can be cultivated but is not. The rest of the land is quite incapable of cultivation. There are thus 250 million more acres which might be brought under cultivation. It must be realised, however, that in the case of a good pro-

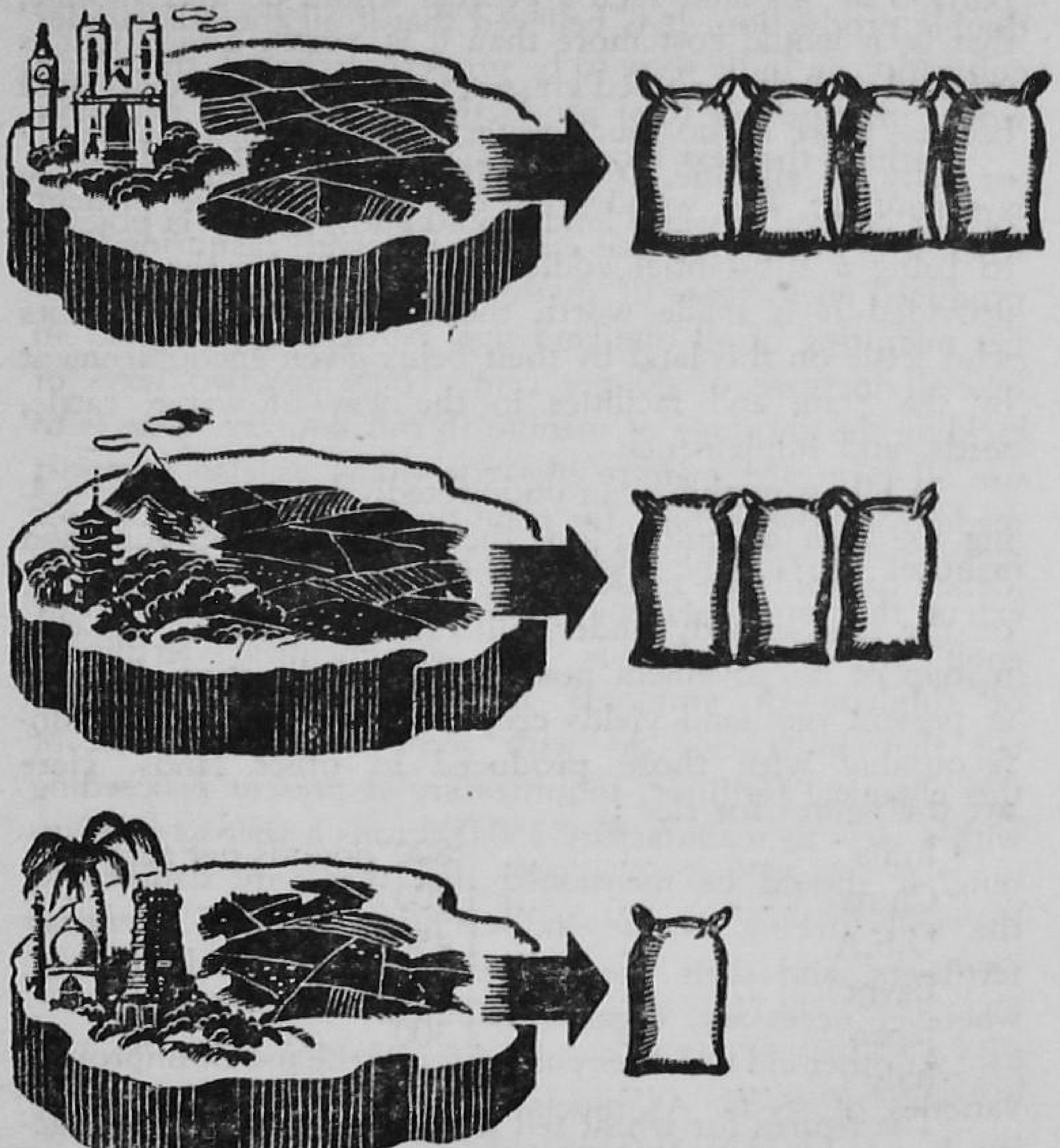
portion of this land such a process would be uneconomic, that is, it would cost more than it is worth. Some of it is infested with deep-rooted grasses, some cannot be cultivated because there is too much water, some because it is sandy or salty or alkaline. It is likely, however, that a survey of our cultivable waste land would show that it is possible to bring a substantial additional area under the plough, provided it is made worth the while of the cultivators who settle on this land by their being given encouragement by the State and facilities in the way of water, cattle, seeds, and implements.

While something can undoubtedly be done by extending the area of cultivation, the better part of our food deficit can only be made good, however, by growing more on the land already under cultivation. There is a wide margin of improvement possible in this direction, because at present our land yields crops which compare very unfavourably with those produced in other lands. Here are the figures for rice :

India	800	pounds per acre
China	1,400	,, ,, ,,
U.S.A.	1,450	,, ,, ,,
Egypt	2,000	,, ,, ,,
Japan	2,300	,, ,, ,,
Italy	3,000	,, ,, ,,

The figures for wheat tell the same story. Our production of wheat has remained stationary at about 800 pounds per acre for many decades. In Germany, however, the production of wheat per acre went up from 1,500 in 1921 to 2,200 in 1941, while in Italy it rose from 900 pounds to 1,350 pounds during the same period.

It has been estimated that, all in all, an acre of land in India yields on the average 1/4th of what it does in England and 1/3rd of what it does in Japan. This shows how much more we can grow if we only decide to.



The methods by which the development of agriculture can be achieved are many and varied. Each of them calls for scientific investigation and intensive research.

Perhaps no single factor affects agricultural production more radically than the supply of water, whether by natural means or by artificial irrigation. Irrigation can work miracles by converting dry desert land into a land of plenty. Even on land already in cultivation, proper irrigation can

double production. It is believed that if all the land under cultivation in India were to be properly irrigated, this alone would increase our total production by about 50 per cent.

Perhaps the next most vital aid to increased production is manuring. The wonders it can work will be evident when it is mentioned that experiments with manuring have produced an increase of anything up to 150 per cent. Proper manuring of all our land may be expected to yield an over-all increase of 30 per cent. There are two ways of tackling the shortage of manure in our country. One is to use all farmyard manure like cow-dung, as also compost made from town refuse, for manuring the soil. Such organic manures are of the highest value for the soil. To the extent that any deficiency still remains, it can be made good by the judicious use of chemical fertilisers, of sulphate ot ammonia in particular. It is estimated that India can do with some 5 million tons of this chemical fertiliser. Inquiries are at present proceeding with a view to manufacture 350,000 tons a year as a beginning. It should be mentioned that there are dangers to the soil lurking in the indiscriminate use of chemical fertilisers, and their use should be only to supplement, wherever necessary, organic manures.

Another aid to better cultivation is the use of improved varieties of seeds. As much as 10 to 15 per cent more can be produced by this means.

Improved implements and the use of machines like tractors and threshing and harvesting machines is another line of development which is worth considering. Here again, the indiscriminate use of motor tractors has been known to ruin the soil. Mechanised agriculture should be resorted to cautiously and under proper control.

Erosion of the soil is one of the major evils that has to be dealt with. It is a result of our own follies. It has been truly said that God never made a desert. Terracing

and bunding is one way of meeting this evil. Another is a large-scale programme of afforestation.

Another respect in which our cultivators stand in need of help is in regard to the oppressive burden of debt under which they labour and the provision of cheap credit. Transport and marketing facilities and an assured minimum price for their products are yet other needs of our farmers.

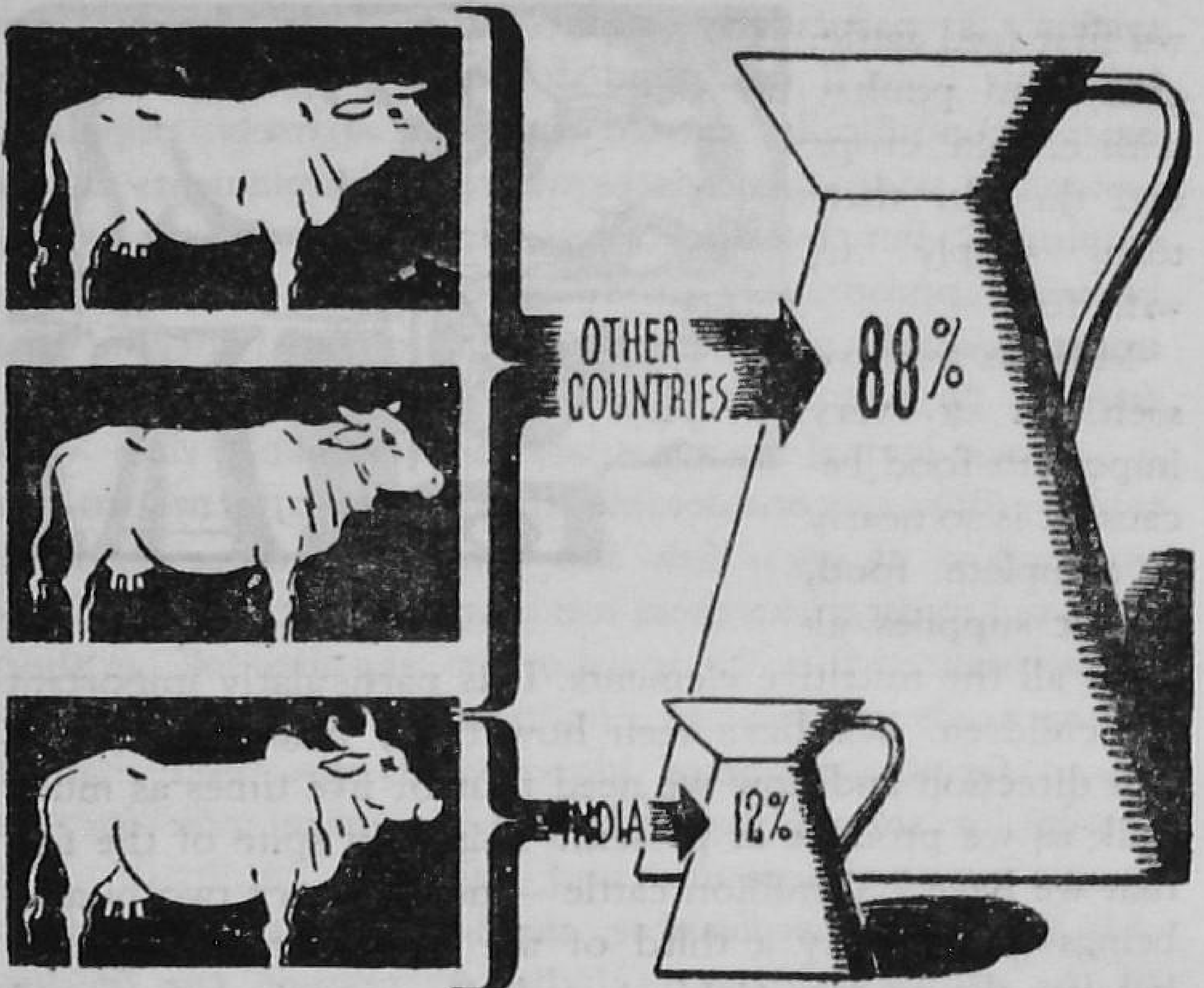
It is a moot point whether these means of improvement can be made available to our cultivators so long as the system of land tenure continues to be what it is at present and *only a third of our land is owned by those who till it.* There are many experts who agreed with the London journal, *The Economist*, when it wrote last year that nothing less than a far-reaching agrarian revolution was necessary before Indian agriculture could be set on its feet. Such a revolution in our countryside would certainly involve the redistribution of the land among the actual tillers of the soil in economic holdings which would not be subdivided and fragmented into "dwarfs' holdings" as at present. This would call for far-reaching measures towards the elimination of the evils inherent in a system of absentee landlordism. What is important is that the actual cultivator who works on the land should have a sense of security of tenure and feel that the fruits of his labour will accrue to him and his family. This security and incentive can be provided best by a system of peasant proprietorship, leavened by model collective and co-operative farms which would set an example in progressive farming.

So far we have thought in terms of growing more food directly from the soil in the way of foodgrains, vegetables and fruit. There are, however, other foods besides these, the most important being milk, meat, fish and eggs. These animal products are also in a way products of the land, but indirectly so. Instead of eating what the soil produces,

we first feed cattle, sheep and poultry with certain crops and they in their turn supply us with food.

Milk, as we have seen, is a very important food because it is so nearly a complete food, i.e., it supplies almost all the nutritive elements. It is particularly important for children. We have seen how badly placed we are in this direction and how we need four or five times as much milk as we produce at present. This is in spite of the fact that we have 200 million cattle—one for every two human beings—and nearly a third of the world's total. That is because the average yield of an Indian cow is just over 2 lbs. a day, compared with the corresponding yield per cow of 20.5 lbs. in Holland, 15 lbs. in England and 14 lbs. in New Zealand. It is true that this is to a small extent compensated by higher fat content. The fat content of the milk of the Indian cow is 25 to 50 per cent greater than that of the milk of a Western cow, while the fat content of the milk of an Indian buffalo is 100 per cent higher. All the same, the fact remains that with 28.5 per cent of the world's cattle we produce only 12 per cent of the world's milk. Germany produces the same quantity of milk with 25 million cattle as we do with our 200 million.

How is this state of affairs to be remedied ? Obviously our cattle are in a sad state and need, like us, to be better fed. At present they, like us, are suffering from chronic under-feeding. This means that the production of fodder



crops has to be increased. So also, what are called concentrates like oil cakes, cotton seed and gram, have to be made available in much larger quantities. Another thing that calls for attention is the method of breeding, by which the quality of the cattle may be improved. If such measures are taken, it will be possible to increase our yield of milk very substantially, even though it may not reach the level that has been achieved in Holland or England or New Zealand.

This development will mean a change over to what is known as the system of mixed farming, that is, growing crops combined with dairy farming. Agriculture began in all parts of the world with grain production. It was at an advanced stage of history that animal husbandry became part of the agriculturist's life and what is known as mixed farming came to be adopted. This

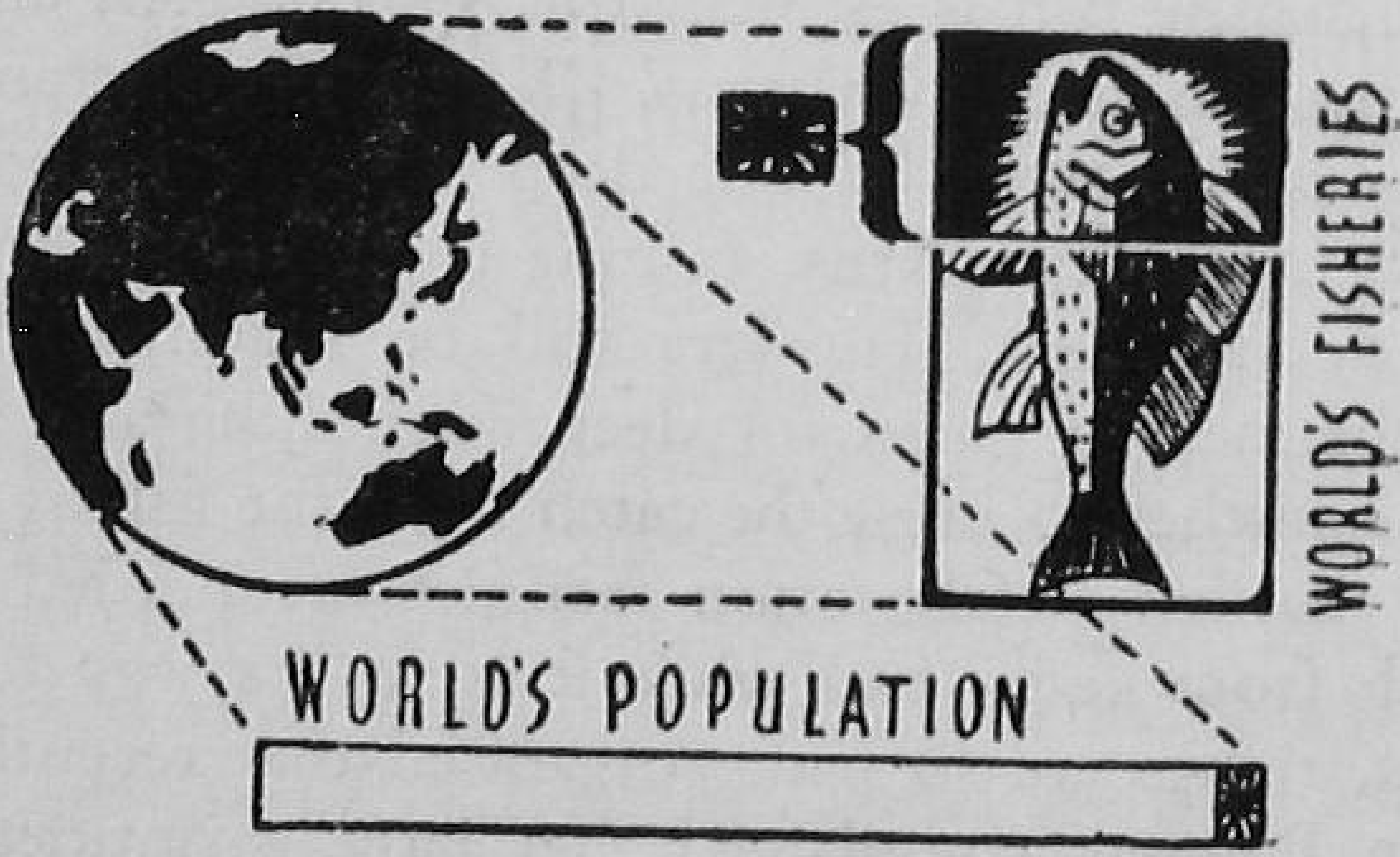
system is particularly suitable for India because, as Sir John Russell has pointed out : "Grain cropping is most economically carried out on sparsely populated regions of wide open spaces where big implements can be employed, but livestock, eggs, fruit and vegetables can be very appropriately produced on small farms and can under skilful management offer a satisfying life to a trained farmer."

Since animal proteins are more valuable than vegetable proteins, considerable importance attaches to the production of eggs, fish and meat. For those who are prepared to eat them, these foods are of great help in achieving a balanced diet. Here again, the supplies fall far short of the needs of even our non-vegetarian population. Once mixed farming becomes more widely practised than at present, it should not only provide more milk for our people but also more meat and eggs.

What is most feasible, perhaps, is the development of the fishing industry in India. At present, the production of marine fish is estimated at 450,000 tons and of inland river fish at 220,000 tons. With proper arrangements there is no reason why our deep sea fishing should not yield us manifold returns. Fishing in rivers and tanks also needs development. Trawlers will be required to enable our fishermen to go in for deep sea fishing and also fast motor launches to bring the catch from the fishing grounds to the market. Refrigeration facilities are needed to keep the fish from going bad while it is on its way to us. At present, things are so badly organised that recently fishermen in Bombay complained that large quantities of fish went bad and had to be thrown away because they could not get ice at reasonable prices !

Apart from the greater quantity of fish that would be available and which would be of great nutritive value, the developments of the fishing industry would also make for

larger production of fish liver oils. There are great possibilities of a shark liver oil industry, which would be very valuable to fight the vitamin deficiencies from which our people suffer. The Japanese people, in spite of their tiny country and only 3.3 per cent of the world's population, possess nearly one-third of the fisheries in the world. With their ration of fish they have been able to supplement the rice diet on which they, like us, depend. Perhaps the difference in vitality and virility between the average Japanese and the average Indian is to be partly explained by the larger quantity of fish which the former consumes. In this respect, at least, we can take a leaf out of the Japanese book.



11. FROM FARM TO KITCHEN

Growing more food is only the beginning of the job of feeding people. Food has to be taken all the way to the hungry mouths that await it. Several processes are called into operation here and their efficient working can make all the difference between satisfaction and starvation.

Transport, obviously, is one of the major factors here. Food has to be taken from the village to the local market-town and from there to the province, district or city where it is required. It may travel part of the way by bullock cart, part by motor truck, part by train, part by boat. The transport of food, therefore, requires adequate facilities in the way of road, rail and shipping alike. In this respect, as in so many others, a lot remains to be done. With an area of approximately 1,580,000 square miles, our country has about 41,000 miles of railways, while Europe (excluding Russia), which has an only slightly larger area, has 190,000 miles of railways. So too, we have in British India 35 miles of roads per 100 square miles of territory, while the corresponding figures for Japan, the United States of America and Britain are 300, 200 and 100 miles respectively. That is why the *Fifteen Year Plan* aims at an increase of 50 per cent in railways and of 100 per cent in road mileage.

It is not enough, however, to lay railroads and build roads. We have also to make the locomotives and the

motor trucks that are to carry the food. India's national means of transport today is the bullock cart. With its iron or wooden tyres, it imposes a heavy burden both on the bullocks and the roads. There is no doubt that the bullock cart has a useful part to play in the building up of a prosperous countryside for many decades to come. What is urgently necessary is that the carts which come on the roads should be fitted with pneumatic tyres which will lighten the burden both for the bullock as well as for the road surface.

At various stages in its journey, food has to be stored, and storage plays an important part in food economy. At present there is considerable waste of food. Quite a bit of it is eaten by rats and insects, while some more is allowed to decay through lack of proper ventilation and care. It is estimated that the annual wastage of foodgrains amounts to no less than 3.35 million tons, of which as many as a million tons are destroyed by rats alone. Improved storage facilities are badly needed.

Marketing is an equally important process in the movement of food from farm to kitchen. The foodstuffs have to change hands, in some cases several times, before they move from the producer to the consumer. At present there are too many of these middlemen, each of whom makes a profit by way of brokerage or commission, with the result that of the rupee which you and I spend for our food only eight or ten annas go to the cultivator. As the cultivator can only be expected to be efficient and get the most out of the soil if he is assured of a fair price, it is important that he should get as much of the price we pay as possible. This can be effected by encouraging co-operative marketing. Co-operation has made such progress in Britain that during war time a third of the entire population is served by co-operative societies. To the extent that trading remains in the hands of individual traders

a system of licensing, of standardization and of pure food legislation needs to be brought into effect to safeguard the illiterate and ignorant cultivator and the consumer from the devices of the unscrupulous middleman.

Not only is the cultivator entitled to a fair price, he also needs the assurance of a steady price, which alone can give him a sense of security that what he produces will fetch him a steady and adequate return. Agricultural prices have in the past too often collapsed because of international factors completely beyond the Indian cultivator's control, with the result that he lacks the incentive to do his best. The maintaining of a steady price would be possible if the government were to buy the crop to the extent that the market does not absorb it and to hold it against a rainy day. This means the creation of a Foodgrains Reserve. In America and other countries, the government builds up a reserve of this kind, both in order to keep prices up to a steady level and to guard against scarcity during a bad season that may follow. That is why the United Nations Conference on Food and Agriculture recommended the creation of a common world pool of

certain basic foods which would be diverted to those parts of the world whose needs are most urgent. The Conference aimed at the setting up of a committee which would arrange for the establishment of a world pool and its operation. In our own country, the Foodgrains Policy Committee also attached considerable importance to the creation of a Central Foodgrains Reserve which should consist of not less than 500,000 tons. Their Report stated that "the best guarantee for securing the maximum flow of foodstuffs from the cultivator to the consumer is a Central Reserve." In order to build up such a Reserve the Committee recommended that 500,000 tons of foodgrains should be immediately imported into India for the purpose. Unfortunately, no imports have yet been made available for this purpose. If such a reserve had existed last year, as many as three-and-a-half million of our people (as estimated by the Anthropological Department of the Calcutta University) would not have died in Bengal of starvation and of diseases caused by starvation.

Closely linked up with the building up of a Reserve are methods of preservation of food which have been developed in other countries. One well-known method of keeping food from going bad is refrigeration, which means freezing it. This is specially applicable to flesh foods, fish, milk products, vegetables, and fruit. In our own country, in cities like Bombay, we have municipal cold-storage chambers where food can be stored and preserved in this way. So too, some of our well-to-do city folk have frigidaires in their homes. In America, frozen food-lockers have been in use on farms and now simple inexpensive home-freezer models are reported to be available. In Britain too, a startling advance in quick freezing of food for household use is being made. According to an expert, "the secret is that all these foods must be frozen solid and frozen quickly. Quick freezing does not take away any flavour

or the vitamin value in foods. Soft fruit such as strawberries and raspberries should be frozen solid within 45 seconds, vegetables within 50 to 55 seconds, fish within 60 seconds, and meat in 90 seconds. Eggs have been frozen and kept for eighteen months. Tomatoes and bananas have been frozen successfully and kept for nine months. Green tomatoes have been put in cold storage for seven months, ripened after being taken out and thawed. The cost is 'ridiculously low,' working out at a penny per year for every pound of food frosted and kept in cold storage."

Another way of preserving food is to dry it. This process has been described by the big name "dehydration," which means, as the name suggests, removing the water. There is a surprisingly large amount of water in various foods, ranging from 10 to 15 per cent in cereals and pulses, to 70 to 80 per cent in fish and other flesh foods, and 75 to 95 per cent in fruits and vegetables.

Now, dehydrating of some kind we have had in India for countless centuries. Have you never eaten dried fish or pieces of dried bananas, mangoes, brinjals, figs, apricots and dates, from which water had been dried up by exposing them to the sun ? That is quite a widespread practice in certain parts of India. The idea behind this primitive practice has been to preserve fruits, vegetables and fish, which are highly perishable, for consumption after a period of several weeks or months.

Wars are both mad and bad, and little good ever comes of them. Along with a lot of harm that they do, however, comes sometimes a little benefit. One of such small benefits provided for us by the recent war was the progress that has been made in the dehydration of food. One of the big problems in modern war is the transport, along with the armies, of the food with which to feed them. Foods like vegetables and fruits occupy a huge lot of space in ships and trains. If, however, they

are first dehydrated, then their bulk shrinks a lot and their transport becomes easy.

That is why today dehydration is on a large scale proceeding in India, as in other countries, not by drying in the sun but by first scalding in hot water and then by allowing a stream of hot air to blow on the stuff for five or six hours. In 1943, no less than 150,000 tons of potatoes were, for instance, dehydrated for the use of troops in India alone.

Nowadays, meat and vegetables are cooked before being dehydrated and then compressed. They then look like slabs of toffee. When you want to eat the stuff, all you have to do is to take a piece of the slab and place it in a pot of boiling water. You can then see it looking more and more like its normal self, till in two or three minutes it is ready to eat, with its original taste and even its smell almost restored ! Examination of dehydrated food in Coonoor has shown, however, that the vitamin in dehydrated vegetables is considerably reduced by a few months of storage. The taste is also sometimes affected. It is believed, however, that improved methods of dehydration have been devised which will reduce this loss in vitamins and in palatability.

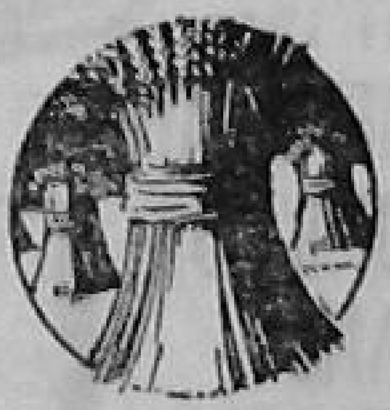
We may soon find this war-time invention of permanent use, both to preserve things like mangoes, which grow only for a few months in the year in large quantities, and also to transport over long distances fruits and vegetables which are highly perishable.

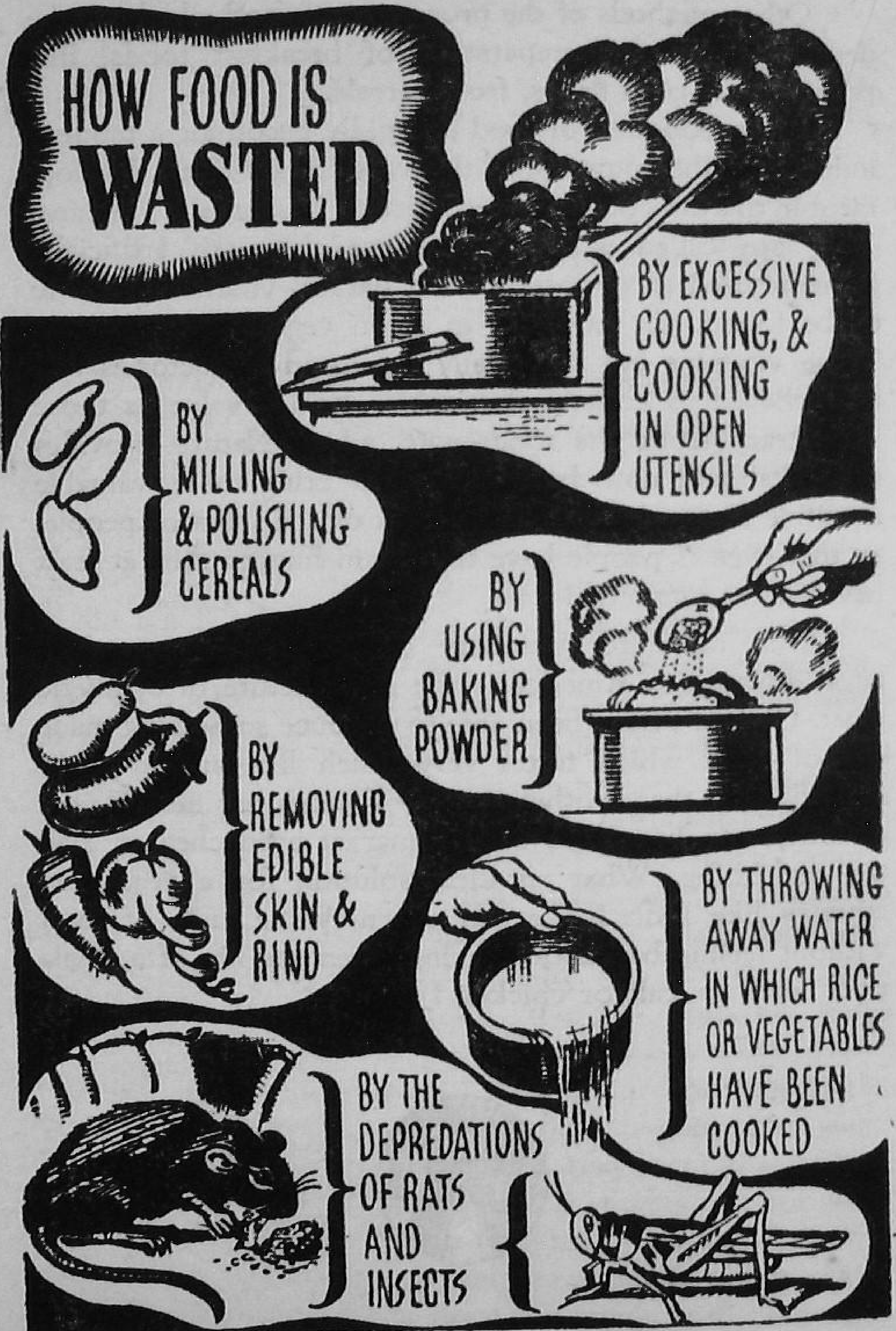
Yet another way of preserving food is by canning it, that is, by packing it in tins. Most tinned foods available in our country till now have been those imported from abroad. As a result, they have been within the reach of only the well-to-do classes. There is great scope for a canning industry to be set up in India by which food can be preserved economically for our wants.

Other methods of the processing of food which can be developed are the preparation of breakfast foods, like porridge and corn flakes, from cereals.

The production of food is rapidly becoming a modern industry in the countries of the West. The biggest development in this direction is the production of synthetic vitamins. They are called synthetic because they are artificially manufactured as opposed to the natural vitamins that are to be found, for example, in green vegetables and milk. These vitamins are chemically produced in factories and are believed to contain the same nutritive value as those we extract from the foods with which Nature provides us. It should now be possible to bring these valuable nutritive elements within the reach of the mass of people, so that even if people have to remain hungry they at least have all the vitamins !

Even more revolutionary changes may come. The latest advance in America is the manufacture of synthetic meat. Chemists have been able to produce something made out of yeast which tastes very much like animal flesh. It is claimed that synthetic meat, if produced in sufficient quantity, can be placed on the market even cheaper than the real thing. What an ideal solution for a vegetarian country like India ! We can all enjoy the taste of meat without feeling bad about having taken the life of a single poor lamb or calf or chicken !




HOW FOOD IS WASTED
BY EXCESSIVE COOKING, & COOKING IN OPEN UTENSILS
BY MILLING & POLISHING CEREALS
BY USING BAKING POWDER
BY REMOVING EDIBLE SKIN & RIND
BY THROWING AWAY WATER IN WHICH RICE OR VEGETABLES HAVE BEEN COOKED
BY THE DEPREDATIONS OF RATS AND INSECTS

12. MAKING THE MOST OF IT

We have seen in how many different ways we can increase the stocks of food produced in our country. Most of these methods would, however, take some time to show results. Meanwhile we just have to make the most of what we have already got. Aren't we doing so ? I am afraid the answer is that we are not. Of the food that we produce at present, we waste a fair bit. I am not referring to the little bits of food that we leave uneaten in our plates and *thalis*. The waste I am talking of takes place in the kitchen or even before the food reaches the kitchen.

We have already seen in CHAPTER 4 how we waste some of the most nutritive elements in our staple food grains. We saw there how the pericarp and germ in the rice grain, which contain valuable protein, vitamins and minerals, are thrown away by unnecessary milling and polishing. We saw, for instance, how we can avoid such waste and get the most out of our rice by first par-boiling it and then either hand-pounding it or milling it just once instead of three or four times, as has been the practice in many parts of the country. That is why Gandhiji has for many years now been asking us to eat only hand-pounded and no milled rice. To-day, with starvation rampant in India, even the government has now realised the need of stopping this waste and has made rules in some

provinces prohibiting the milling of rice beyond a certain point. The Japanese saw the importance of this long before us. They too used to eat raw milled rice like us, but when they saw the ill effects they got their Emperor Hirohito to set the fashion by eating under-milled rice, with the result that most people followed his example. In this respect people in some provinces of India are greater sinners than those in other provinces where home-pounded rice is still largely being eaten. In Assam, for instance, not less than 97 per cent of the rice is hand-pounded. The United Provinces come next with 93 per cent. In Bihar and Orissa 90 per cent of the rice is hand-pounded. Bengal's percentage is 84, the Central Provinces' 70, and that of Madras, sad to say, only 38.

Vegetables are another foodstuff of which we do not make the most. In cooking vegetables we often use baking powders. This has the result of destroying vitamins B_1 and C. Vitamin C is particularly sensitive and can be destroyed within five minutes. The use of baking powders should, therefore, be avoided. Cooking in open utensils also results in vitamins being destroyed by oxidation through the air. The use of closed cookers reduces such waste. In fact, excessive cooking of food of any kind has a tendency to destroy vitamins. Should we then eat vegetables raw ? There are many vegetables which we can eat raw with advantage, but we have to make sure that they have been cleaned properly to avoid the danger of infection.

The rind of vegetables and the peel of fruits, wherever eatable, should not be thrown away. As we saw in Chapter 4, they do not give us nutrition but they provide roughage.

Milk too is a food which often suffers at our hand. It is said that excessive boiling of milk lessens its vitamin content. On the other hand, if milk were not to be boiled there would be the greater danger of micro-

bes growing in the milk and making it dangerous to drink, particularly for children. In recent years, a way has been found out of this dilemma. That is to pasteurise milk and not boil it. Pasteurising is the name given after Louis Pasteur to the process of keeping milk on the fire at a low heat for a long period of about twenty minutes. This process has the same sterilising effect as boiling, but it saves the vitamins from being burnt up by the extreme heat you get at boiling point. On no account should milk be taken raw in India and, where pasteurised milk is not available, milk should always be boiled.

Another way in which there is waste in connection with milk is that the fullest use is not made of skimmed milk, that is, of what remains after cream and butter have been extracted from whole milk. Skimmed milk is not as nutritious as the real thing, because fat has been removed from it. But it still contains protein, sugar and mineral salts and every drop of it should be made use of. Up to now, people from Europe and America, who know the value of skimmed milk, have bought it up very cheap in certain parts of India, though not in substantial quantities, dried it till it became a powder and taken it away from India to their own countries, so that they could make casein out of it for industrial purposes or make use of it for health tonics. These clever people then ship some of this stuff back to India in attractive bottles and we poor mugs pay a few rupees for what we could have got in India for a few annas !

One way to increase the natural value of foodstuffs we have already seen in CHAPTER 4 in respect of pulses. We saw there that by allowing pulses to sprout we can actually manufacture vitamin C in them.

So far we have talked of things which cost money. But there are other things which Nature provides free to each of us. These are fresh air and sunshine and water.

These three things should also be regarded as food. Unfortunately, as they can be had for nothing, their importance is not sufficiently realised, many of us have a notion that what we get free is worthless ! Fresh air and sunshine help to promote good digestion and general vitality. Sunshine also helps to develop vitamin D in our body, which makes us vigorous and vital. That is why, in spite of deficiency in vitamin D in their food, people in Southern and Central India, where the sunshine is very bright, escape evils like rickets and osteomalacia which are much more rampant in Northern India. This contrast is particularly to be noticed in the case of women in Northern India who are kept behind the *purdah* and are thus deprived of their fair share of sunshine and fresh

air. Apart from its other bad features, the *purdah* system needs to be abolished on grounds of health alone.

Water helps to dilute the partially digested food and increases the internal secretions, thus completing the digestion and assimilation of our food. It should be drunk in good quantities preferably between meals.

13. FOOD AND INCOME

There are many reasons why the diet of our people is not properly balanced and is deficient in important elements of nutrition. One is the widespread ignorance of the value of different foods. Another is custom or habit based sometimes on religious prejudices. The main factor, however, is neither ignorance nor habit. It is poverty. The prime cause of half-empty stomachs is empty pockets.

It is true not only in India but in other countries also that not the quantity alone but also the quality of a man's food improves as his income rises. The richer class of people naturally eat the best food, though often even their diet can be lopsided ; the middle-class people do not do so well, but not badly either ; it is always the peasants and the labourers whose food is inadequate to their needs. This is only natural because the more desirable foods like milk, eggs, fruit, vegetables and even meat are more expensive than inferior foods like foodgrains. We have seen earlier how a given acre of land can produce a greater quantity of food in the form of foodgrains than of meat, milk or eggs. That is the main reason why these latter foods are the more expensive. A good diet, generally speaking, costs more than a poor one.

Investigations made by nutrition workers in different parts of the country have shown that the quality of diet varies roughly with the income. One such investiga-

tion was carried out by Dr. K. Mitra in Jamshedpur in 1939 among employees of the Tata Iron and Steel Works. This was the result :

	1	2	3	4
Monthly income.	Up to Rs. 30/-	Rs. 30/- to 45/-	Rs. 45/- to 90/-	Rs. 90/- & above.
Daily intake :		(ounces)		
Cereals ...	23.9	24.4	27.1	21.0
Pulses ...	2.4	3.1	3.8	3.4
Non-leafy vegetables	2.3	2.7	5.5	6.2
Green leafy ...	1.2	1.0	0.3	0.1
Fruits and nuts ...	0.1	0.3	0.9	0.9
Oils and fats ...	0.5	0.8	1.3	1.8
Milk ...	0.5	1.4	2.6	5.7
Meat, fish and eggs..	0.6	0.7	1.3	1.0
Condiments ...	0.7	1.0	1.6	1.6
Sugar and jaggary ...	0.2	0.3	0.7	0.8
Calories ...	2940	3190	3250	3330
Percentage from cereals	83.9	74.9	68.0	61.8

You see from these figures how, as the worker's income rises, he eats better and more varied food. Not only is this so in respect of the quantity as shown by the calories consumed, but also in the balance of diet. For instance, the man earning over Rs. 90/- eats less cereals than members of the poorer groups. On the other hand, his consumption of vegetables and of milk goes up sharply.

A similar survey carried out in 1941-42 by the Gujerat Research Society among lower middle-class Gujaratis resident in Bombay City underlines the same moral. Four income groups were taken, the first with an income of below Rs. 50/-, the second with an income of from Rs. 51/- to Rs. 100/-, the third with an income of from Rs. 101/-

to Rs. 150/-, and the fourth with an income of over Rs. 150/- per month. The table below shows you how the food of these four groups varied in important particulars :

Inco me Gro up	Cereals & pulses oz.	Ghee & oil oz.	Sugar & jaggary oz.	Milk & milk products oz.	Vege-table oz.
I	15.6	2.19	1.18	5.7	4.2
II	12.7	2.18	1.45	9.0	6.2
III	11.7	2.59	1.84	10.6	6.2
IV	12.3	2.53	1.07	11.1	6.8

This shows that food improves with rising income. The survey also showed that only 20 per cent of even the most favoured group with an income of over Rs. 150/- obtained a well-balanced diet.

The amount of milk consumed is perhaps the best reflection of a man's income. The Report on the Marketing of Milk (1943) gives the example of an investigation in Lahore which revealed that people with an income of up to Rs. 25/- consumed less than 3 oz. of milk per day per head, while those with an income of over Rs. 1,000/- consumed over 31 oz. The table below gives the intermediate figures as well :

Up to Rs. 25	...	3.8 oz. of milk per capita.
Rs. 26-50	...	9.2 ,, ,, ,,
Rs. 51-100	...	12.0 ,, ,, ,,
Rs. 101-200	...	13.6 ,, ,, ,,
Rs. 201-500	...	16.0 ,, ,, ,,
Rs. 501-1,000	...	20.0 ,, ,, ,,
Over Rs. 1,000	...	31.2 ,, ,, ,,

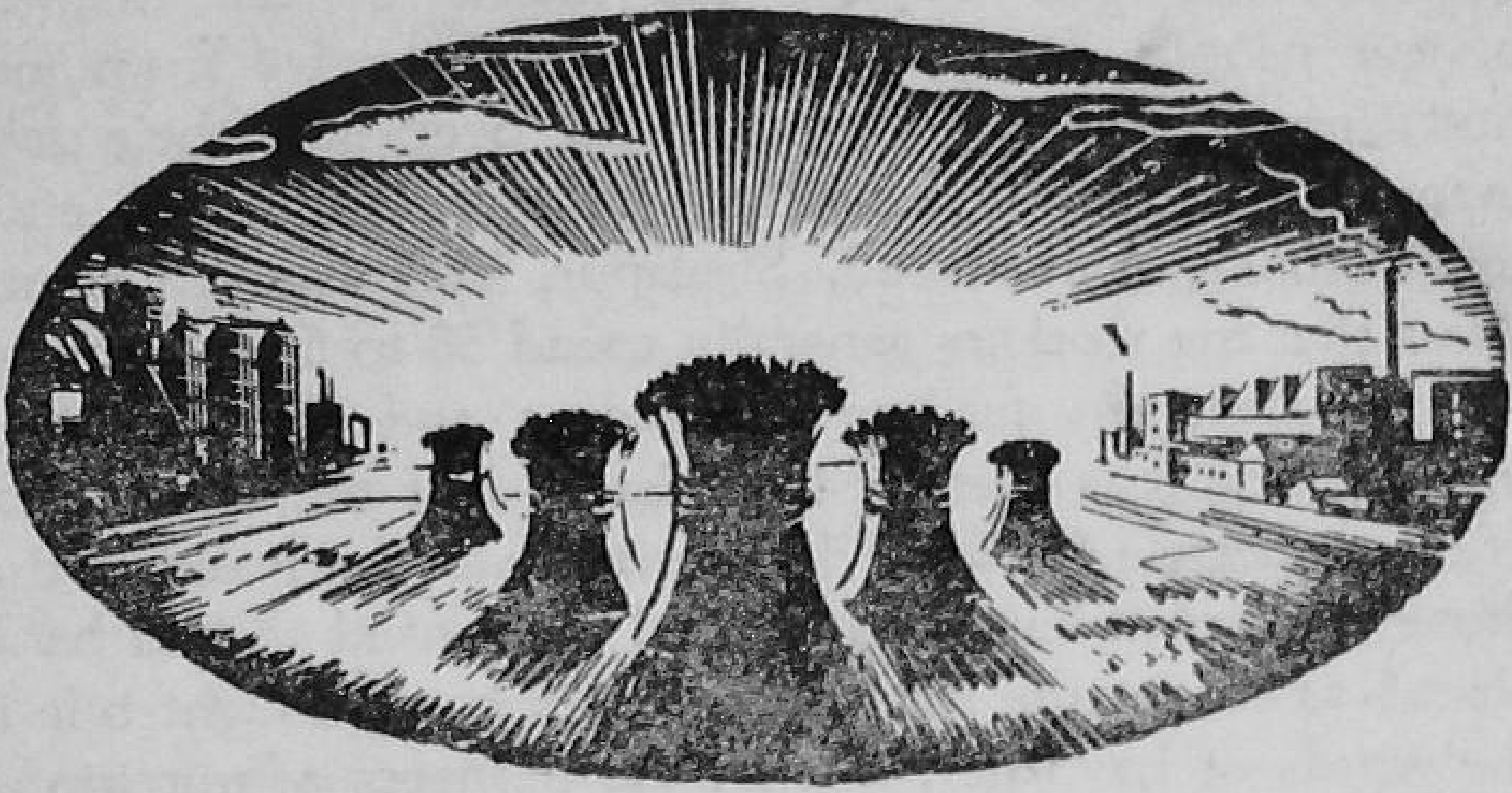
The national income of India is generally estimated to be Rs. 65/- per head per annum, *i.e.*, Rs. 5/7/0 per head per month. The balanced diets worked out in CHAPTER 5 were estimated before the War to cost Rs. 4 to

Rs. 6 per month per adult, or Rs. 16 to Rs. 24 for a family consisting of a father, a mother and three children. Since people have other wants besides food, a well-balanced diet is today far beyond the means of the majority of our people. These people, therefore, suffer from malnutrition even though they spend over half their total income on food. Investigations among workers in cities like Bombay, Ahmedabad, Sholapur, Madras and Calcutta show that the workers generally spend 50 to 60 per cent of their income on feeding themselves and their families. In their case it is literally true that "half the struggle for life is a struggle for food". The irony of the position that those who work hardest and need most food should be so placed as to get the least nutrition is best brought out in the words of Lavoisier, one of the pioneers of nutritional science :

> "By what mischance does it happen that a poor man, who lives by manual work, who is obliged, in order to live, to put forward the greatest effort of which his body is capable, is actually forced to consume more of his bodily substance than the rich man who has less need of repair ? Why, in shocking contrast, does the rich man enjoy an abundance which is not physically necessary, and which seems more appropriate to a man of toil ?"

All this is rather depressing. But what is not depressing is the fact brought out by research that, despite ignorance and prejudice, the Indian, like people in other parts of the world, automatically improves the quality of his food if only he has a little more money with which to buy it. While increased production of food, limitation of population and other specific measures would undoubtedly help to improve the situation, a rise in the income of our people, whether from agriculture or industry or trade, would in itself ensure that our people would be better fed. This

shows that food is no subject apart. It is bound up with the fight for the abolition of poverty, which is one of the biggest crusades on which we as a nation should launch.



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